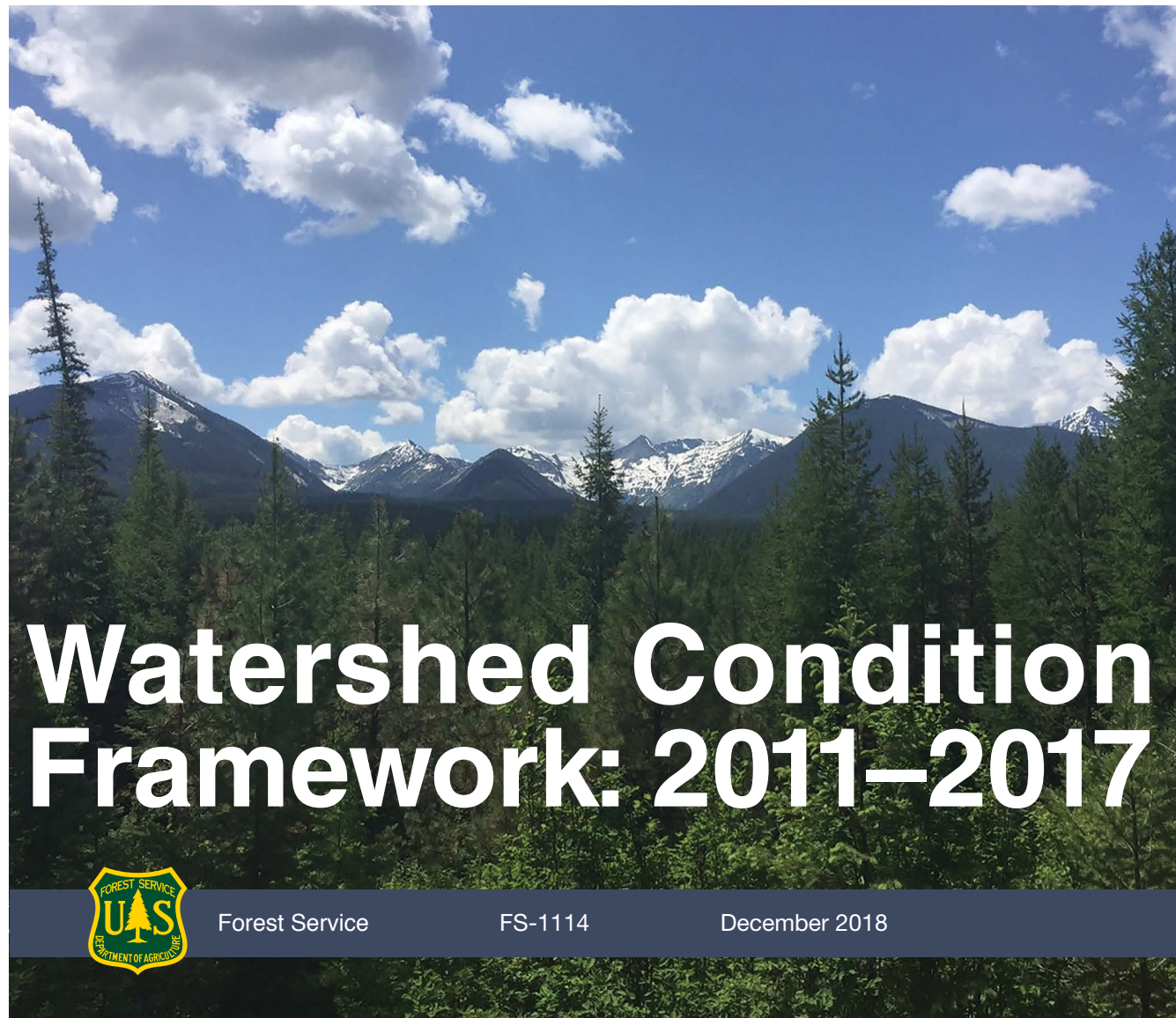




United States Department of Agriculture



# Watershed Condition Framework: 2011–2017



Forest Service

FS-1114

December 2018

Cover photo: The Cabinet Mountains are a part of the Rocky Mountains and located in northwest Montana and the panhandle of Idaho. The mountains cover more than 2 million acres. USDA Forest Service photo.



Completed bridge on Farmer Creek in Siuslaw National Forest, Oregon. The Farmer Creek-Nestucca River Watershed serves as a critical spawning and rearing habitat for the stocks of Oregon Coast coho salmon that are listed as threatened under the Endangered Species Act. Among other restoration efforts in this watershed, 11 Federal, State, and local partners worked with the Forest Service to reconnect 7.5 miles of habitat through projects such as reconstruction of this bridge. USDA Forest Service photo.

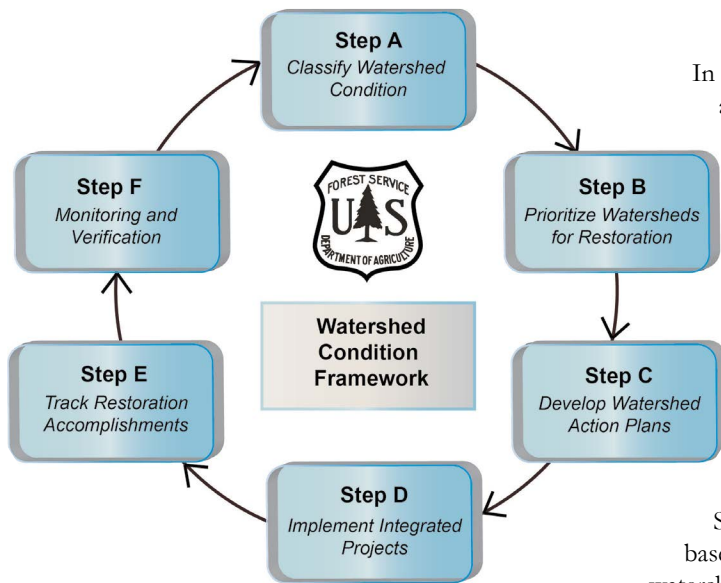
# INTRODUCTION

Our Nation's forests and grasslands produce abundant, clean water to sustain ecosystems and communities. As stewards of more than 193 million acres of land and the waters arising from those lands, the Forest Service, an agency of the U.S. Department of Agriculture (USDA), protects, conserves, maintains, and restores a variety of biologically diverse ecosystems to provide for resilience and adaptation to changes in land use, climate, and user demands. To achieve this goal, the Forest Service works with partners at Federal, State, and local levels to help ensure that National Forest System (NFS) lands and other forested lands function effectively to collect, store, filter, and deliver high-quality waters that sustain people and the resources on which they depend.

Introduced in 2010, the Watershed Condition Framework (WCF) is an important aspect of Forest Service efforts to effectively protect and improve the Nation's water and forest resources. The WCF is the agency's first nationally consistent approach to assessing watershed condition and aligning management actions in priority watersheds. Through applying the WCF, the Forest Service has increased integrity of national reporting on watershed restoration activities, enhanced the efficiency of the agency's restoration work, and

created a foundational tool in achieving USDA and Forest Service strategic goals. Although the WCF is national in scope, prioritization of watersheds and implementation of restoration activities are done regionally and locally. Local-level decision making and implementation enables individual communities to determine how to best steward their forests and capitalize on the benefits from their restoration efforts. The local nature of these efforts can be seen through the diversity of activities highlighted in this report. Ranging from improving decaying road infrastructure that harms water quality to creating off-stream water sources for livestock to protect sensitive vegetation, projects completed under the WCF umbrella help the Forest Service and our hundreds of partners improve watershed condition.

The WCF is implemented through a six-step process (figure 1) that includes assessment (Step A), prioritization (Step B), planning (Step C), implementation (Step D), tracking (Step E), and monitoring (Step F). The entire WCF process, from classification to monitoring, is implemented by local national forest and grassland employees. Implementation by local staff is fundamental to the WCF, because they are the resource experts who have working knowledge of existing conditions and have the partner relationships necessary to ensure successful projects.



In Step A, watershed condition (the state of the physical and biological characteristics and processes within a watershed that affect the soil and hydrologic functions supporting aquatic ecosystems) is assessed at the subwatershed level. All 15,082 subwatersheds containing at least 5 percent NFS land were initially assessed in fiscal year (FY) 2011, and about one-fourth have been reassessed in the past 6 years because of changing conditions or significant new information. As of FY 2017, 53 percent of these watersheds were functioning properly, 44 percent were functioning at risk, and 3 percent had impaired function (figure 2).

Step B, the prioritization of watersheds, is a locally based interdisciplinary process with the goal of aligning watershed restoration work with both internal and external priorities. A “priority watershed” is a designated place where restoration activities are intended to be concentrated with the explicit goal of

Figure 1. Watershed Condition Framework Process.

As of 2017, 53 percent of the watersheds were functioning properly, 44 percent were functioning at risk, and 3 percent had impaired function.

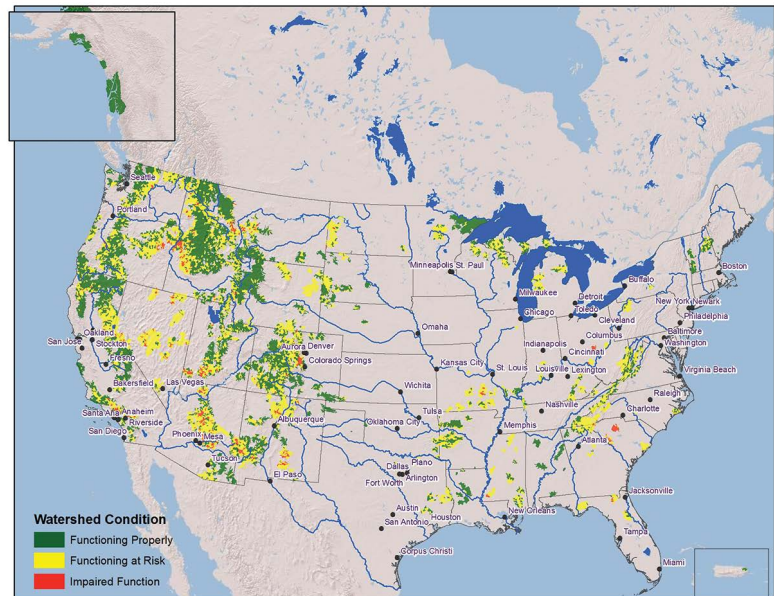


Figure 2. Watershed Condition on National Forest System lands as of October 2017.



Restored section of Meadow Creek on the Nez Perce-Clearwater National Forests, Idaho. USDA Forest Service photo.



Volunteers installing a water bar in the Upper Star Hope Creek Watershed, Salmon-Challis National Forest, Idaho. To improve this popular all-terrain vehicle trail, a 1/4-mile section was rerouted to reduce impacts to the stream channel and water quality. USDA Forest Service photo.

maintaining or improving its condition. Priority watersheds are selected based on agency restoration priorities, the urgency of management action to address conditions and threats to the watershed, or alignment with partner strategies and priorities. At the end of 2017, 291 priority watersheds had been identified across 111 national forests and grasslands.

In Step C, all national forests and grasslands develop Watershed Restoration Action Plans to restore, improve, or maintain watershed condition for each priority watershed based on detailed field assessments by interdisciplinary teams. The Watershed Restoration Action Plan outlines specific problems that affect watershed condition and identifies the projects that are essential to addressing those problems, as well as time-frames, partners, and funding sources for these projects. These

“essential projects” are a discrete group of conservation actions that are implemented as an integrated suite of management activities intended to improve or maintain watershed condition.

Watershed Restoration Action Plans identify from one to a dozen or more essential projects. In Steps D and E, activities identified in the action plan are implemented and reported to track project outcomes. Step F completes the WCF cycle by monitoring conditions after essential projects are complete and verifying that the projects have achieved their objectives. This document is part of Step E in the Framework and is intended to provide insight into watershed improvement and maintenance efforts during the first 6 years of implementation for the WCF. For more detail on the steps to the WCF, see the WCF document (FS-977) at [https://www.fs.fed.us/biology/watershed/condition\\_framework.html](https://www.fs.fed.us/biology/watershed/condition_framework.html).





## OVERVIEW OF WATERSHED ACCOMPLISHMENTS

Between 2011 and 2017, all restoration or maintenance projects identified in the associated Watershed Restoration Action Plans were completed in 91 watersheds that encompass 2.2 million acres of Federal and non-Federal lands. These 91 watersheds range from remote locations such as Munoz Canyon on the Carson National Forest in New Mexico to frequently visited locations like the Red River Gorge on the Daniel Boone National Forest in Kentucky. The implemented essential projects directly improved more than 93,000 acres, 275 stream miles, and 1,430 miles of road or trail. Of these watersheds, 58 percent directly contribute to municipal or domestic water supply and are U.S. Environmental Protection Agency surface water or wellhead protection areas (figure 3). This work was made possible through the assistance of 287 partnerships (205 unique partners) that contributed more than \$20.4 million in improving watershed conditions, or about one-third of the total investment of \$57.9 million.

For purposes of this report, essential projects were organized into seven descriptive categories: aquatic and riparian, hazardous fuels, range vegetation, forest vegetation, recreation, roads, and soils. The most common types of essential projects (figure 4) are those that directly benefit aquatic and riparian areas (40 percent) and decommissioning or improving roads (26 percent).

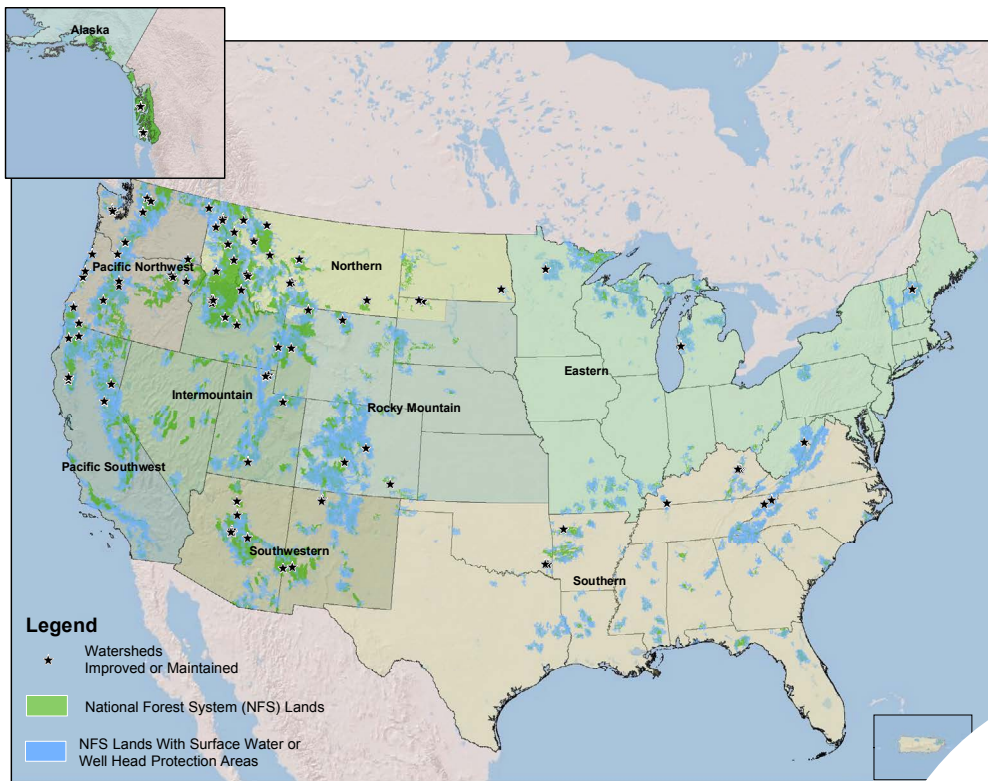


Figure 3. National Forest System lands with U.S. Environmental Protection Agency surface water or well head protection areas and location of 91 watersheds maintained or moved to an improved condition between FY 2011 and FY 2017. Note: Watershed size not to scale, so locations may not be exact.

## WATERSHED IMPROVEMENT FOR DRINKING WATER SUPPLIES

Although 58 percent of the 91 watersheds improved directly contribute to clean and abundant water supplies, there are 6 watersheds where more than 95 percent of the area is considered to be a surface-water protection area for municipal water supply. Restoration in these watersheds protects the drinking water supply for 15 communities in rural California, Oregon, and Utah.

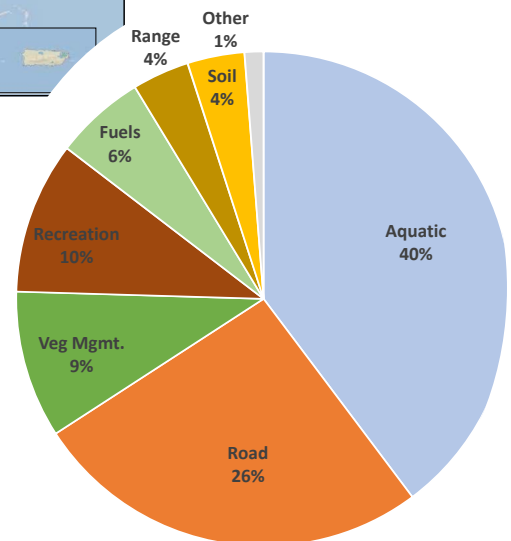


Figure 4. Percent of essential projects by category for all National Forest System watersheds moved to an improved condition, FY 2011–FY 2017.

Although restoration of watershed condition is a priority across all regions of the Forest Service, the specific challenges and needed restoration activities vary across the country (figure 5). In the Southern Region, 26 percent of all projects were associated with recreation—for example, reducing impacts from dispersed site recreation and trail improvement—whereas in the Pacific Southwest, Eastern, and Alaska regions, very few essential projects were associated with recreation. With more than 380,000 miles of roads and tens of thousands of road-stream crossings on NFS lands, all regions have essential projects that focus on the decommissioning or improvement of roads. Overall, 71 percent of all watersheds included roadwork to improve or maintain watershed conditions, and 44 percent of watersheds included work to improve stream crossings and the ability for aquatic organisms to move unimpeded through stream networks. Nationwide, in WCF priority watersheds, more than 650 road-stream crossings have been removed, 840 miles of road decommissioned, and 420 miles of road improved to increase connectivity and reduce erosion and sedimentation (figure 6).

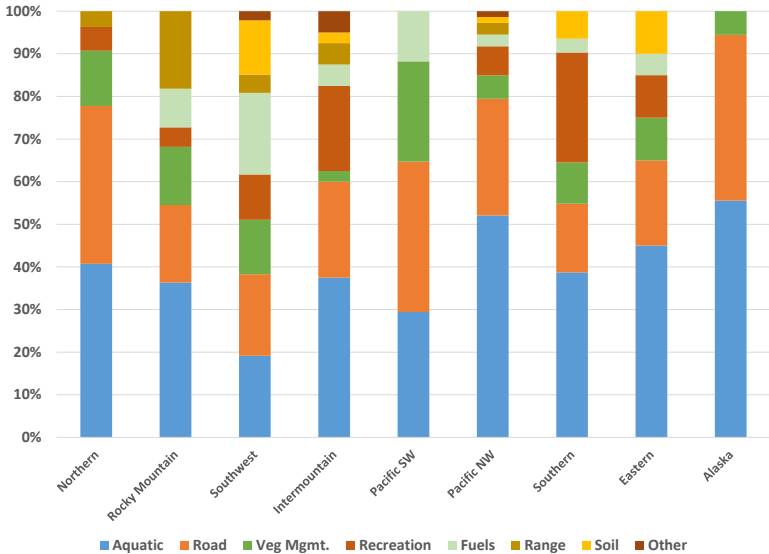


Figure 5. Essential project categories by Forest Service Region.

## RESTORING STREAM FORM AND FUNCTION IN IDAHO

The Iron Creek-Little North Fork Coeur d’Alene River Watershed on the Idaho Panhandle National Forests has been altered as a result of resource extraction and extensive human use during the past 100 years. The watershed is heavily used by hunters, fishermen, and other recreationists, including berry pickers, campers, all-terrain vehicle (ATV) riders, mountain bikers, and those seeking the solitude of the forest. Roads in the riparian area, failing culverts, riparian harvest, ATV trails along and across streams, and the presence of railways and dikes in the floodplain altered the form and function of the Little North Fork of the Coeur d’Alene River and its tributaries. From 2011 to 2015, the forest, together with partners, invested \$2.05 million to restore watershed conditions by decommissioning 106 miles of road, enhancing 31 miles of stream, restoring 7.8 miles of floodplain, placing more than 2,500 pieces of large wood, removing 167 road-stream crossings, and recontouring 131 headwater swales. Partners from Idaho Department of Environmental Quality, Idaho Fish and Game, North Idaho Fly Casters, Inc., and Girl and Boy Scouts of America helped with riparian planting. A study group from India with Forest Service International Programs and the Coeur d’Alene Trust helped with monitoring watershed conditions.

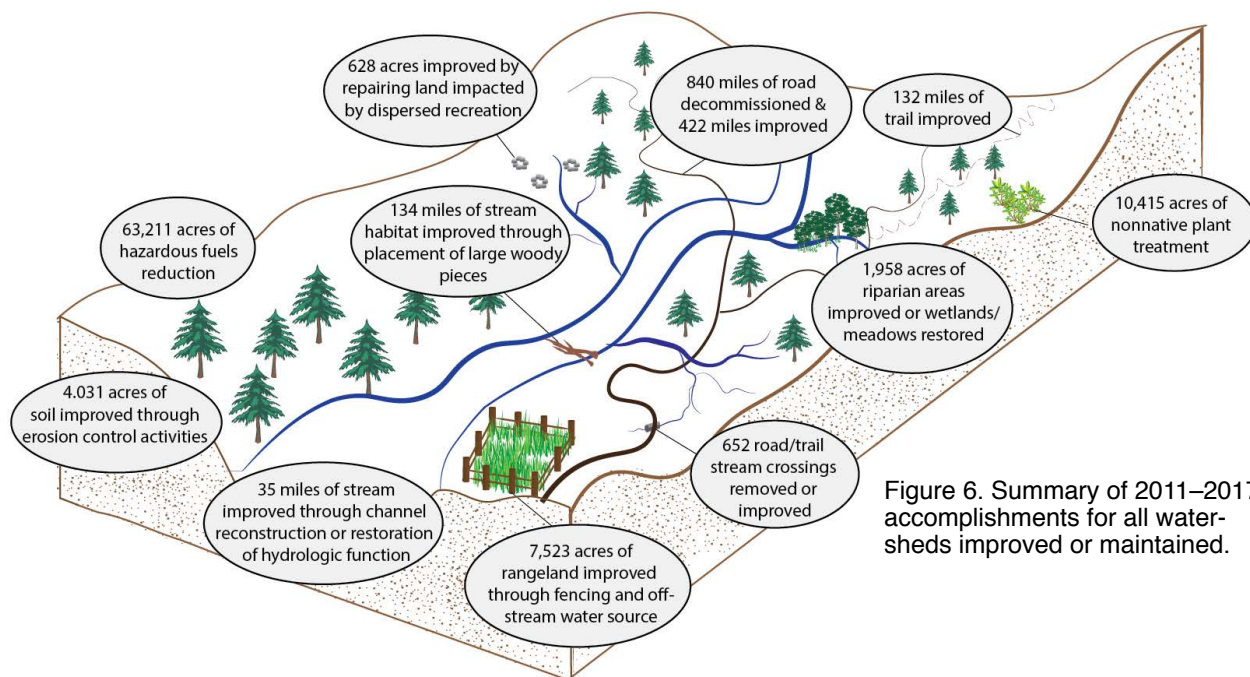
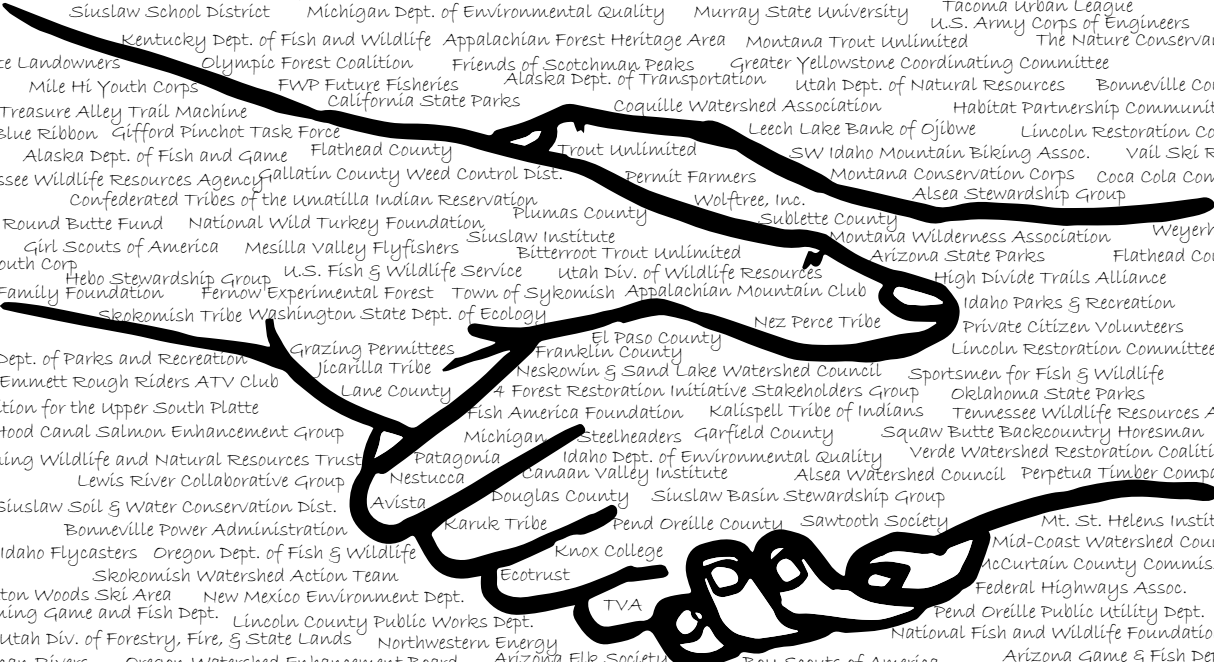


Figure 6. Summary of 2011–2017 accomplishments for all watersheds improved or maintained.

The variety of levels of investment in watershed restoration mirrors the diversity of projects and degree of need within the 91 watersheds completed. Restoration investment under the WCF ranged from \$15,230 in the Minnie Canyon-Purgatorie River watershed to \$4.6 million on the West Creek Watershed, both on the Pike and San Isabel National Forests in Colorado. Restoration costs varied based on the degree of degradation and the type of work necessary to improve or maintain conditions. For example, the work in the Minnie Canyon-Purgatorie River watershed consisted of road improvement and fencing to exclude grazing as the work necessary to improve the watershed. The West Creek Watershed projects included removing or improving hundreds of in-channel structures, creating sediment detention basins, several road-river crossings, and restoring hydrologic function to 3 miles of stream.

Whether restoring a priority watershed identified through the WCF or completing work in other watersheds, partnerships with local communities are key. Of the 91 watersheds improved or maintained, 83 percent included at least one partner in the effort. Contributions came from Federal partners such as the U.S. Fish and Wildlife Service which, for example, contributed \$180,000 toward restoration activities in the Jackknife Creek Watershed on the Caribou-Targhee National Forest and from local partners like the Emmett Rough Riders ATV club that provided in-kind assistance to maintain trails in the Bull Creek watershed on the Boise National Forest. State and local governments also play an important role in this work. Of all the watersheds, 47 percent had a State or local government partner. Tribes also supported watershed restoration, with 8 unique Tribes investing in 11 different watersheds. See figure 7 for a list of partners that have assisted in WCF watershed maintenance and improvement efforts.



Great Falls Trail Riders Assoc. Youth Conservation Corps Montana Trail Riders Assoc. Tillamook County Public Works Dept.  
 Skagit River System Cooperative Snake River Salmon Recovery Board Idaho Dept. of Fish and Game U.S. Bureau of Land Mgt.  
 East Multnomah Soil and Water Conservation District Grand River Cooperative Grazing Association Prescott Yavapai County YCC  
 Wyoming Conservation Corps U.S. Environmental Protection Agency Green Diamond Resource Company ConocoPhillips Company  
 National Forest Foundation Florence-Salmon Trout Enhancement Montana Fish, Wildlife, & Parks Mule Deer Foundation  
 Montana Dept. of Environmental Quality Shoshone-Bannock Tribes Bitterroot Water Forum Student Conservation Assoc. Veterans Crew  
 Siuslaw School District Michigan Dept. of Environmental Quality Murray State University Tacoma Urban League  
 Kentucky Dept. of Fish and Wildlife Appalachian Forest Heritage Area Montana Trout Unlimited U.S. Army Corps of Engineers  
 Private Landowners Olympic Forest Coalition Friends of Scotchman Peaks Greater Yellowstone Coordinating Committee The Nature Conservancy  
 Mile Hi Youth Corps FWP Future Fisheries Alaska Dept. of Transportation Utah Dept. of Natural Resources Bonneville County  
 Treasure Alley Trail Machine California State Parks Coquille Watershed Association Habitat Partnership Community  
 Utah Blue Ribbon Gifford Pinchot Task Force Trout Unlimited Leech Lake Bank of Ojibwe Lincoln Restoration Com.  
 Alaska Dept. of Fish and Game Flathead County SW Idaho Mountain Biking Assoc. Vail Ski Resorts  
 Tennessee Wildlife Resources Agency Gallatin County Weed Control Dist. Permit Farmers Montana Conservation Corps Coca Cola Company  
 Confederated Tribes of the Umatilla Indian Reservation Plumas County Wolfree, Inc. Alsea Stewardship Group  
 Pelton Round Butte Fund National Wild Turkey Foundation Siuslaw Institute Sublette County Montana Wilderness Association Weyerhaeuser  
 Girl Scouts of America Mesilla Valley Flyfishers Bitterroot Trout Unlimited Arizona State Parks Flathead County  
 NW Youth Corp Hebo Stewardship Group U.S. Fish & Wildlife Service Utah Div. of Wildlife Resources High Divide Trails Alliance  
 Reser Family Foundation Fernow Experimental Forest Town of Sykomish Appalachian Mountain Club Idaho Parks & Recreation  
 Skokomish Tribe Washington State Dept. of Ecology Nez Perce Tribe Private Citizen Volunteers  
 Idaho Dept. of Parks and Recreation Grazing Permittees El Paso County Franklin County Lincoln Restoration Committee  
 Emmett Rough Riders ATV Club Jicarilla Tribe Neskowin & Sand Lake Watershed Council Sportsmen for Fish & Wildlife  
 Coalition for the Upper South Platte Lane County 4 Forest Restoration Initiative Stakeholders Group Oklahoma State Parks  
 Hood Canal Salmon Enhancement Group Fish America Foundation Kalispell Tribe of Indians Tennessee Wildlife Resources Agency  
 Wyoming Wildlife and Natural Resources Trust Patagonia Idaho Dept. of Environmental Quality Squaw Butte Backcountry Horseman  
 Lewis River Collaborative Group Nestucca Canaan Valley Institute Verde Watershed Restoration Coalition  
 Siuslaw Soil & Water Conservation Dist. Avista Douglas County Siuslaw Basin Stewardship Group Alsea Watershed Council Perpetua Timber Company  
 Bonneville Power Administration Karuk Tribe Pend Oreille County Sawtooth Society Mt. St. Helens Institute  
 North Idaho Flycasters Oregon Dept. of Fish & Wildlife Knox College Mid-Coast Watershed Council  
 Skokomish Watershed Action Team Ecotrust TVA McCurtain County Commissioners  
 Wyoming Game and Fish Dept. Lincoln County Public Works Dept. Federal Highways Assoc.  
 Utah Div. of Forestry, Fire, & State Lands Northwestern Energy Pend Oreille Public Utility Dept.  
 American Rivers Oregon Watershed Enhancement Board Arizona Elk Society Boy Scouts of America National Fish and Wildlife Foundation  
 Upper Deschutes Watershed Council Sheyenne Valley Grazing Association Madison County Grande Ronde Model Watershed  
 Illinois Valley Watershed Council National Resource Conservation Service Alaska Sustainable Salmon Fund Eagle Rock Backcountry Horsemen  
 Wyoming Girls School Great Lakes Fisheries Trust Swift Community Action Team National Oceanic & Atmospheric Administration  
 Utah Habitat Council Backcountry Horsemen of Washington Siuslaw Soil & Water Conservation Dist. Ruby Pipeline Mitigation  
 Upper Blackfoot Valley Community Council Tillamook Estuaries Partnership Western Native Trout Initiative Oregon Dept. of Environmental Quality  
 Oklahoma Dept. of Wildlife Conservation Washington Conservation Corps Great Old Broads for Wilderness Middle Fork Willamette Watershed Council  
 Pacific Rivers Council Minnesota Dept. of Natural Resources West Creek Water Users Association Tennessee Aquarium  
 James 4-H Camp Michigan Dept. of Natural Resources Trigg County Conservation Dist. Arizona Sportsmen for Wildlife Conservation  
 White River Watershed Partnership Rocky Mountain Field Institute McCall Hiking Club Rocky Mountain Elk Foundation

Figure 7. Partners with the Forest Service in watershed restoration through the Watershed Condition Framework across the country.

# LOOKING AHEAD

By providing a national process for classifying watershed condition and focusing watershed restoration work in priority areas, the WCF helps the Forest Service provide a more efficient process for improving and maintaining the condition of watersheds. Implementation of the WCF has increased Forest Service accountability and helped ensure that investments accomplish on-the-ground improvements.

Implementation of the WCF can be challenging because of changing ecological conditions associated with fire and invasive species. Furthermore, completing the Watershed Restoration Action Plans must be done with existing resources and through support from partners. The variety of priorities for NFS lands also presents a challenge. Alignment of priority watersheds with other agency restoration priorities will be important to the future success of the WCF.

With these challenges also come many opportunities. The value of the WCF could be better demonstrated and its use broadened in numerous areas. One such way to demonstrate value is to utilize the essential project information documented in WCF data systems to create a list of potential projects that could be used as a pipeline of projects to encourage new partners to participate in restoration activities on national forests and grasslands. This method of readily identifying projects of interest could serve as a more systematic approach to stimulating partner-funded work that aligns with Forest Service watershed restoration goals. As success stories detailed in the following regional sections show, partner involvement is already a critical component of the WCF. However, additional opportunities remain for using the WCF to develop and enhance partnerships.

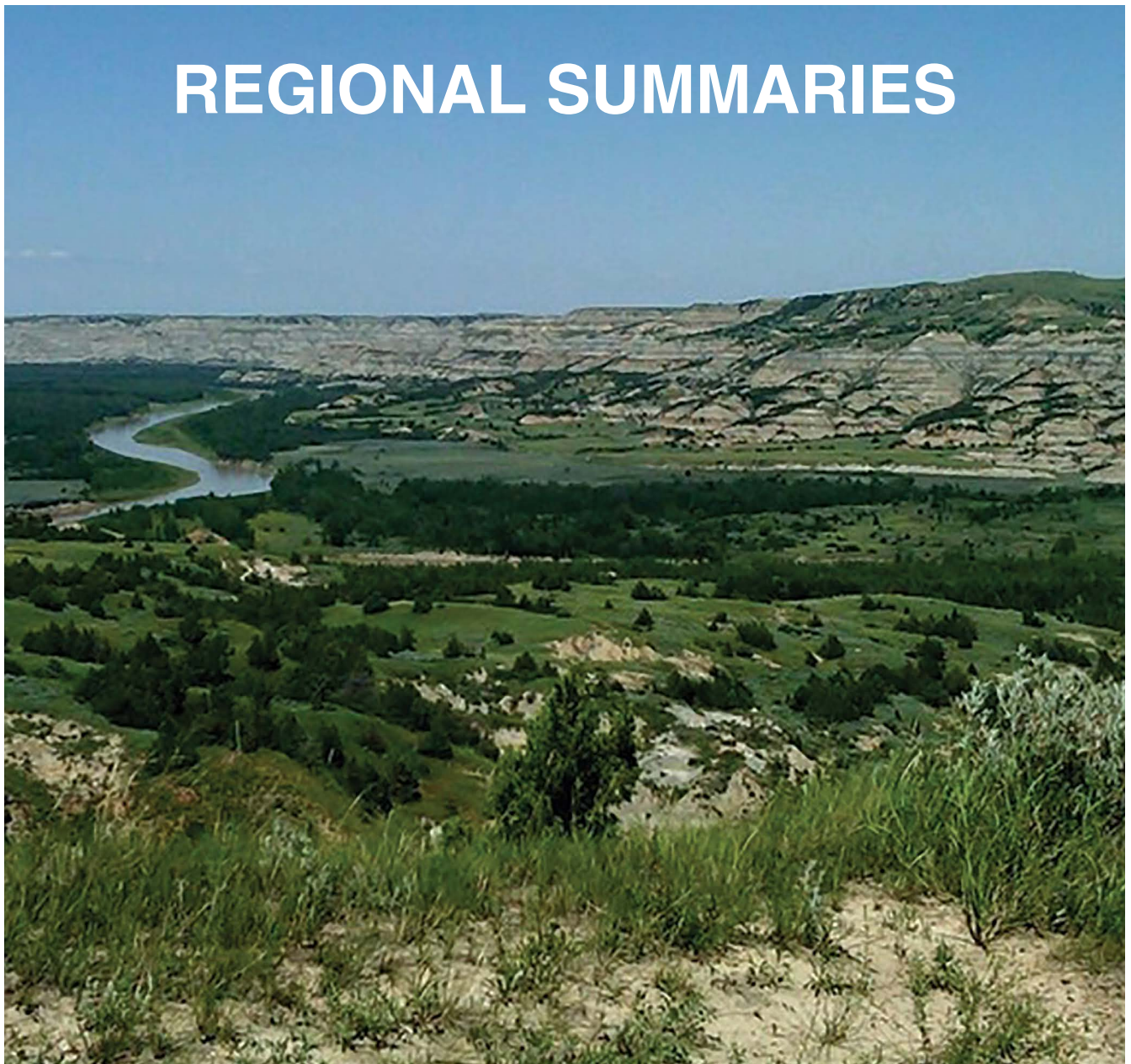
With more than 15,000 watersheds containing NFS land, the 91 watersheds improved and maintained are only a beginning. Many opportunities remain to capitalize on these past successes and continue to leverage the WCF. The WCF is purposefully



Volunteers help cleanup activities on Gladie Creek River, Daniel Boone National Forest in Kentucky. The overall goals for this priority watershed were to improve water quality by reducing sediment sources and solid waste and to educate the public about clean water in a heavily used recreational area, the Red River Gorge. USDA Forest Service photo.

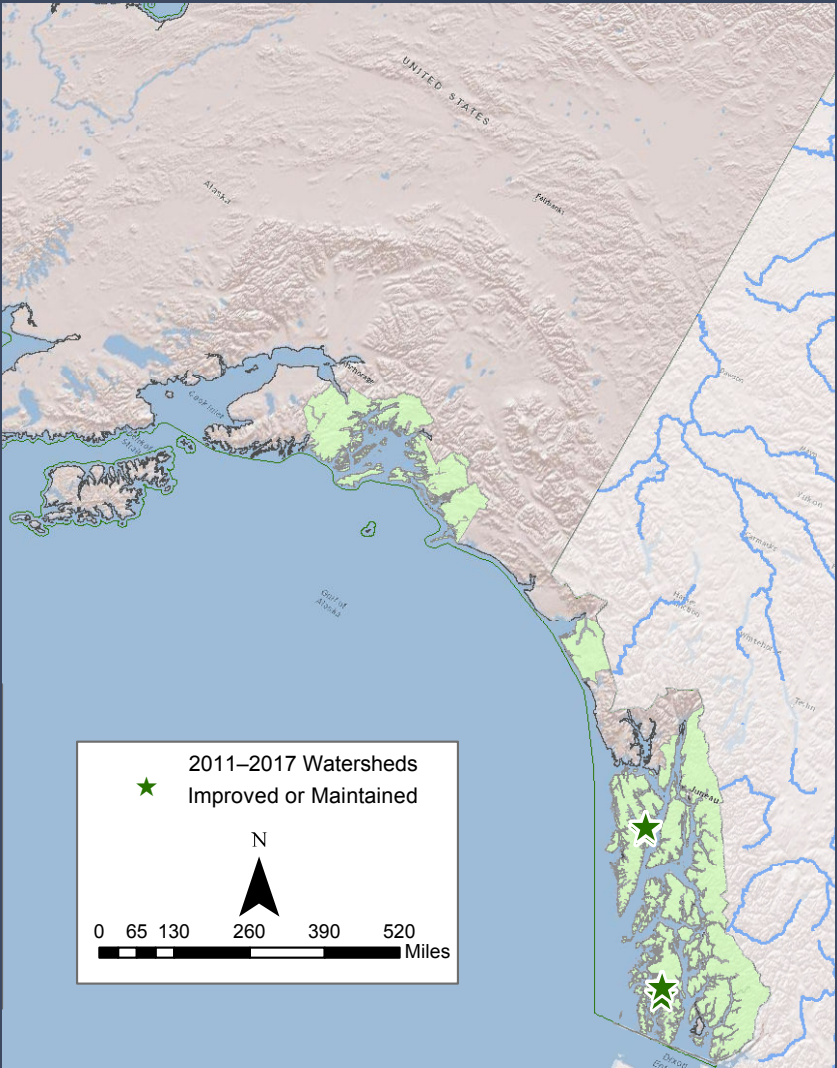
flexible and will continue to mature through dynamic use and interaction with local and national partners. Through sustained implementation of the WCF, the Forest Service will continue to fulfill its commitment of supplying clean abundant water and maintaining healthy forests and grasslands for the American people. Ultimately, the Forest Service can be most effective when working collaboratively with other Federal agencies, States, Tribes, local governments, other landowners, and other stakeholders. As implementation of the WCF continues, the Forest Service will work with these partners to continue to foster a landscape-scale understanding and approach to identifying priorities for water-related programs, research, and management of forests and grasslands.

# REGIONAL SUMMARIES



Dakota Prairie National Grasslands, North Dakota. USDA Forest Service photo.

# ALASKA



4 watersheds improved or maintained

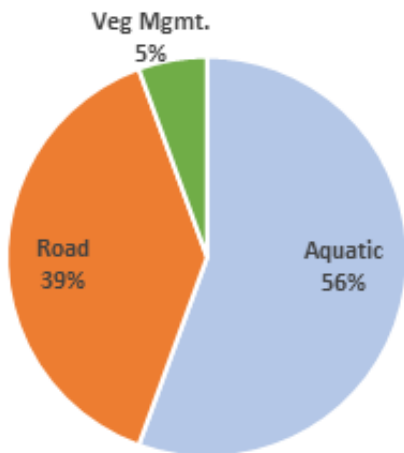
\$1.98 million invested in watershed improvement by Forest Service

\$993,000 by 11 different State, local, and national partners

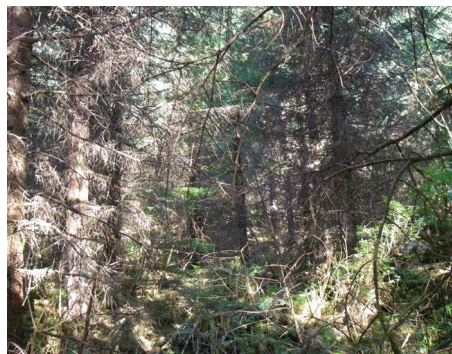
National Forest	Watershed Improved or Maintained
Tongass National Forest, Alaska	Sitkoh Creek
	Sitkoh River
	Twelvemile Creek
	Indian Creek-Harris River

## WATERSHED RESTORATION AND EDUCATION

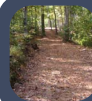
Many restoration projects in priority watersheds throughout the country provide opportunities to inform the public and educate students. One such example in this region is the work performed in the Sitkoh Creek Watershed on the Tongass National Forest, where the Sitka Conservation Society organized an outdoor education class with students from Knox College in Illinois. During the course of a few weeks, 12 students traveled to the forest and helped with work associated with building large wood structures to improve stream habitat.



Alaska Region Categories of essential projects completed in watersheds moved to an improved condition.



Before (top) and after (bottom) riparian thinning in the Sitkoh River Watershed on the Tongass National Forest, Alaska. USDA Forest Service photo.



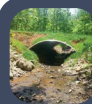
### Recreation Improvements

- ◆ 1 mile of trail
- ◆ 110 acres of dispersed recreation



### Road Improvements

- ◆ 430 miles decommissioned
- ◆ 80 miles improved



### Aquatic Improvements

- ◆ 390 stream crossings
- ◆ 130 acres impacted by gullies
- ◆ 50 miles of stream restoration



### Range & Vegetation Improvements

- ◆ 4,740 acres improved through fencing and other rangeland improvements
- ◆ 2,870 acres treated for non-native plants

## ALASKA REGION HIGHLIGHT WATERSHED

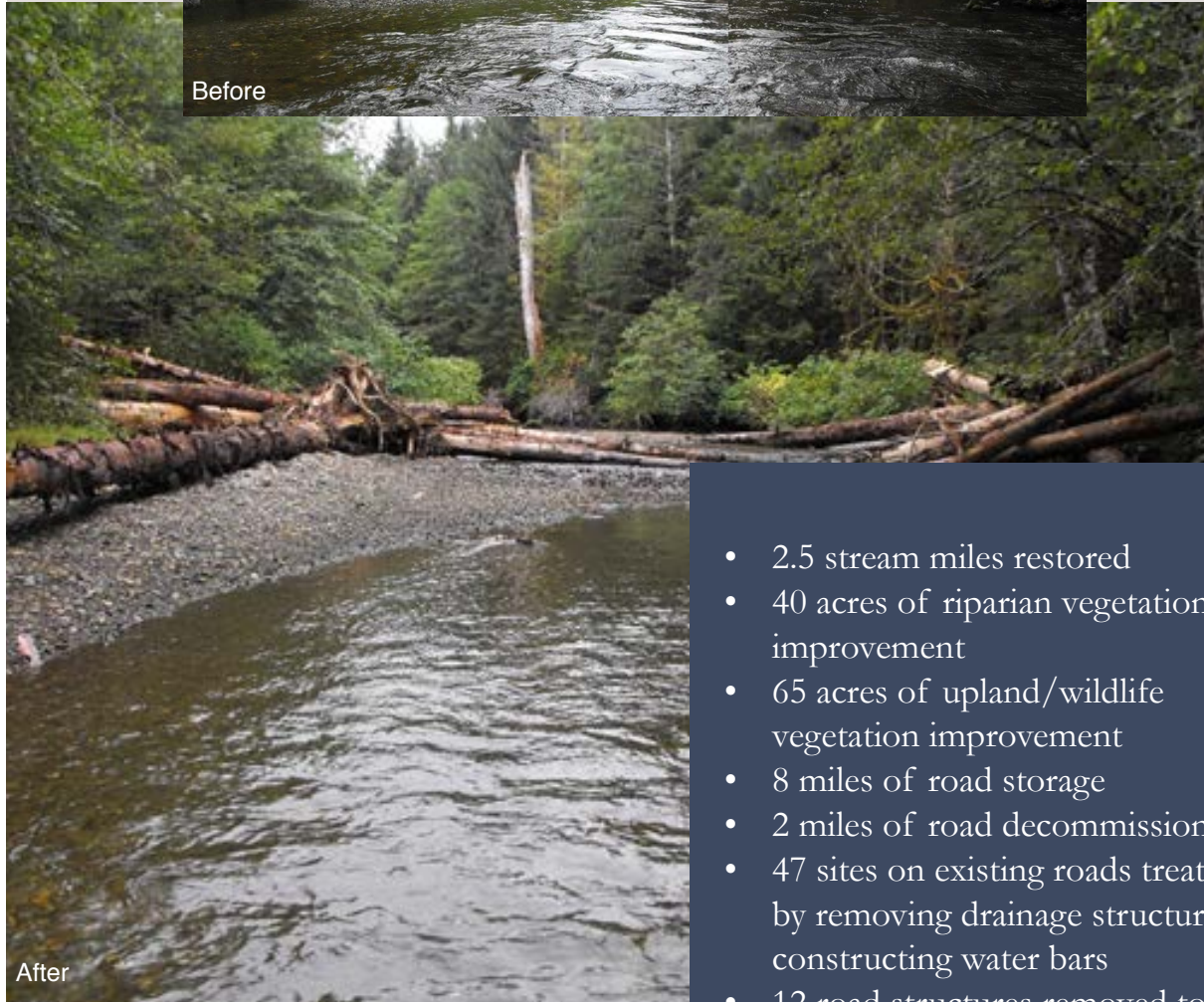
### *Twelvemile Creek, Tongass National Forest, Alaska*

The Twelvemile Creek watershed has important terrestrial and aquatic ecological values. The densely forested uplands consist of robust stands of hemlock, spruce, and cedar that support good numbers of black bear and Sitka blacktail deer. Twelvemile Creek supports three species of salmon, as well as resident and anadromous forms of coastal cutthroat, rainbow, and steelhead trout and Dolly Varden char. The watershed has 13 miles of anadromous stream and 13.5 miles of resident fish stream. Twelvemile Creek became impaired because of logging practices that took place during an era when little riparian and stream habitat was protected. Riparian corridors were clearcut to the stream banks, large wood was deliberately removed from streams, gravel was extracted from streams to build roads, and riparian corridors were used to yard logs to roadside landings. Direct impacts of past management activities include erosion from roads, introduced invasive plants, and impaired fish and wildlife habitat. The deficient large wood recruitment in the main stem and young growth riparian zones resulted in altered sediment transport, low pool counts, long homogeneous stream reaches, and excessive channel widening. The watershed's high road densities tend to negatively impact aquatic habitat through increased rates of sedimentation from erosion, road failures, blocked fish passage, and reduced hydrologic connectivity.

The objectives for Twelvemile Creek were primarily to restore stream bank and stream channel processes, restore natural and beneficial quantities of large wood during the short and long term, restore fish habitat, and maintain optimum water temperatures for fish. In 2014, the National Fish Habitat Partnership listed the Twelvemile Creek watershed as one of its "Waters to Watch" as a model demonstrating innovative and successful fish habitat conservation.

#### **PARTNERS**

*National Forest Foundation, The Nature Conservancy, Prince of Wales Resource Advisory Committee, National Fish and Wildlife Foundation, Fish America Foundation, Alaska Sustainable Salmon Fund*



Twelvemile Creek, Tongass National Forest, Alaska.  
USDA Forest Service photo.

- 2.5 stream miles restored
- 40 acres of riparian vegetation improvement
- 65 acres of upland/wildlife vegetation improvement
- 8 miles of road storage
- 2 miles of road decommissioning
- 47 sites on existing roads treated by removing drainage structures or constructing water bars
- 12 road structures removed to restore fish passage

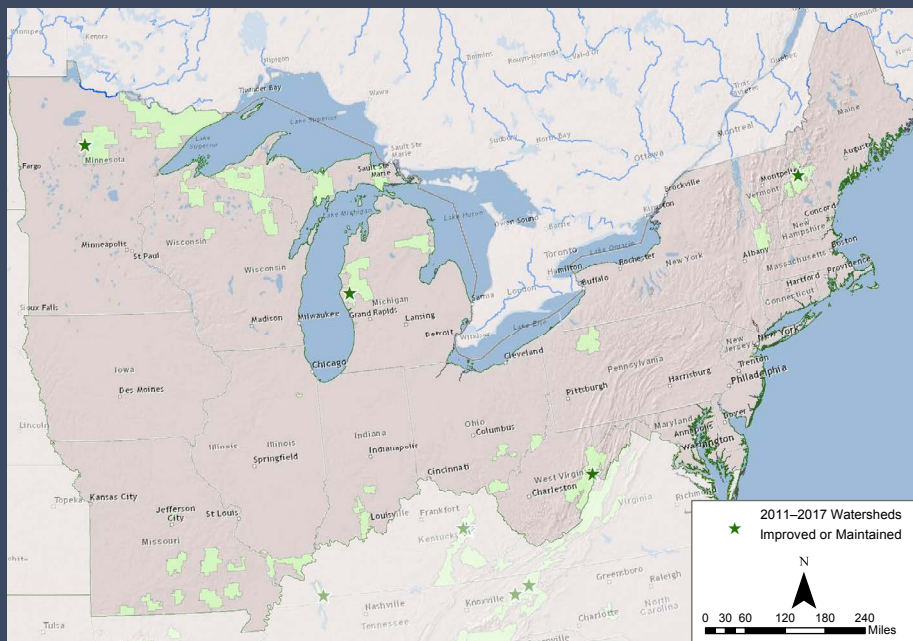
# EASTERN REGION

Illinois, Indiana, Michigan, Minnesota, Missouri, Ohio, Pennsylvania, Vermont, West Virginia, Wisconsin

4 watersheds improved or maintained

\$2.32 million invested in watershed improvement by Forest Service

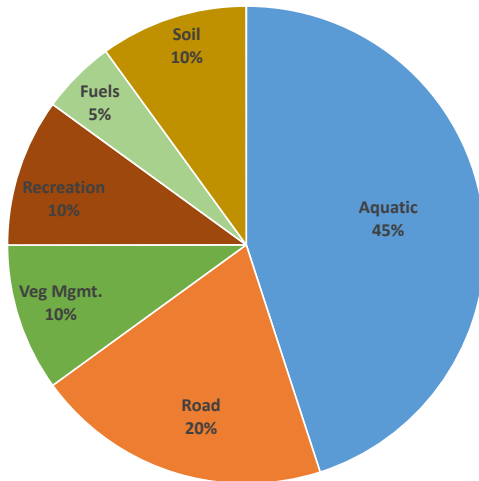
\$890,000 by 17 different State, local, national, and Tribal partners



National Forest	Watershed Improved or Maintained
Chippewa National Forest, Minnesota	Cass Lake
Huron-Manistee National Forest, Michigan	Osborn Creek-North Branch White River
Monagehela National Forest, West Virginia	East Fork Greenbrier
White Mountain National Forest, New Hampshire	Headwaters Ammonoosuc



Before (top) and after (bottom) dam removal on Cass Lake on the Chippewa National Forest, Minnesota. USDA Forest Service photos.



Eastern Region: Categories of essential projects completed in watersheds moved to an improved condition.

## IMPROVING WATERSHEDS THROUGH DAM REMOVAL

The \$2.8 million investment in these watersheds includes the removal of the Knutson Dam in the Cass Lake Watershed on the Chippewa National Forest. The dam was built in the early 1900s as a logging dam but more recently was used to regulate the water levels of nearby lakes and the river. The deteriorating physical condition of Knutson Dam and a forestwide watershed assessment created an opportunity to address the many structural and natural resource issues the dam had produced. In collaboration with the Minnesota Department of Natural Resources, Leech Lake Band of Ojibwe, and the U.S. Army Corp of Engineers, a Knutson Dam Improvement Project design plan was developed and implemented in 2015.



### Road Improvements

- ◆ 20 miles decommissioned
- ◆ 10 miles improved



### Fuels Improvements

- ◆ 1,900 acres of fuel treatments



### Aquatic Improvements

- ◆ 12 stream crossings & 1 dam removal
- ◆ 22 miles of stream restoration
- ◆ 95 miles of riparian improvement



### Range & Vegetation Improvements

- ◆ 3 acres of erosion control or soil improvement
- ◆ 10 acres treated for non-native vegetation

## EASTERN REGION HIGHLIGHT WATERSHED

### *Headwaters East Fork Greenbrier River, Monongahela National Forest, West Virginia*



Trout Unlimited and AmeriCorps members plant a riparian area to reestablish stream shade and bank stabilization, Monongahela National Forest, West Virginia. USDA Forest Service photo.

The headwaters of the East Fork Greenbrier River is a popular outdoor recreation area in the Allegheny Mountains in east central West Virginia. The watershed is part of an ecological hotspot for aquatic biodiversity and special status aquatic species. The 2010 watershed condition assessment identified adverse impacts from early logging such as accelerated soil erosion, stream sedimentation, altered hydrology, elevated water temperatures, channel instability, impaired floodplains, and degraded aquatic habitat. Present-day forest roads were contributing substantial sediment and runoff to the stream ecosystem, and road crossings contributed to aquatic habitat fragmentation. Given this, the goal of the Watershed Restoration Action Plan was to maintain existing favorable watershed conditions while actively pursuing land treatments that could facilitate an effective ecological lift for the aquatic ecosystem at the watershed scale.

Partners contributed approximately 20 percent of project funding, which stimulated local economies by hiring staff, renting equipment, securing lodging, and other activities. Watershed conditions improved, and ecosystem recovery was accelerated as a result of this successful restoration.

#### **PARTNERS**

*Trout Unlimited, Canaan Valley Institute, AmeriCorps (Appalachian Forest Heritage Area), Fernow Experimental Forest*



Newly replaced stream crossing in Abes Run that conforms to stream simulation design criteria and allows passage of aquatic organism, Monongahela National Forest, West Virginia. USDA Forest Service photo.

- 4 stream crossings improved for aquatic organism passage
- 94 miles of riparian improvement
- 21 miles of stream improvement (large wood)
- 15 miles of road decommissioning
- 9 miles of road maintenance

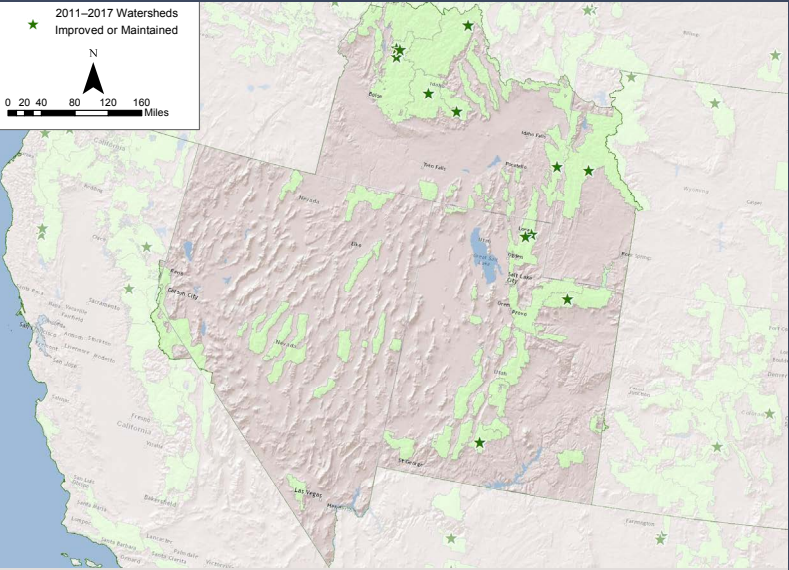
# INTERMOUNTAIN REGION

Idaho, Nevada, Utah, Wyoming

12 watersheds improved or maintained

\$3.97 million invested in watershed improvement by Forest Service

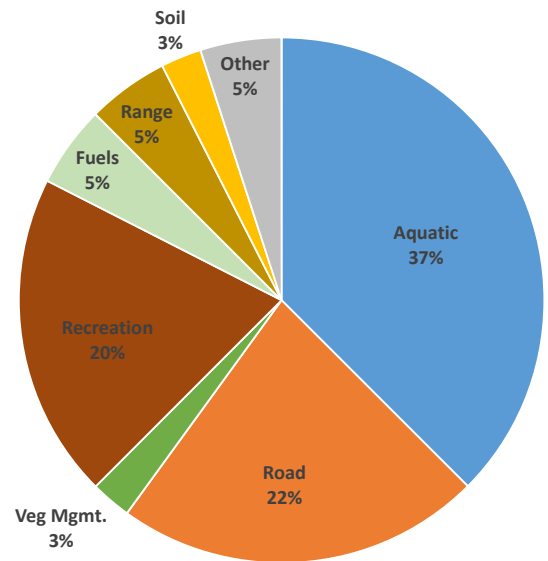
\$622,400 by 42 different State, local, and national partners



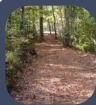
National Forest	Watershed Improved or Maintained
Ashley National Forest, Utah	Swift Creek
Boise National Forest, Idaho	Bull Creek
	Stolle Creek-South Fork Salmon River
	Curtis Creek
Bridger-Teton National Forest, Wyoming	Muddy Creek
Caribou-Targhee National Forest, Idaho and Wyoming	Jackknife Creek
Dixie National Forest, Utah	Birch Creek
Salmon Challis National Forest, Idaho	Upper Star Hope Creek
	Moose Creek
Sawtooth National Forest, Idaho	Pole Creek
Uinta-Wasatch-Cache National Forest, Utah and Idaho	Left Hand Fork Blacksmith Fork Canyon
	Saddle Creek

## IMPROVING WATERSHEDS THROUGH TRAILS AND ROADS

Since 2011, more than 110 miles of road and 62 miles of trail have been improved or, in the case of roads, decommissioned to benefit water quality in priority watersheds in this region. Many of the efforts to improve trails occur in small segments where heavy use contributes excess sediment to streams. For example, in the Upper Star Hope Creek Watershed on the Salmon-Challis National Forest, Idaho, 1/4 mile of trail that receives heavy ATV use was rerouted by hand to reduce impacts on the stream channel and improve water quality. In the Bull Creek Watershed on the Boise National Forest, in Idaho, trail improvement activities included improving 27 miles of trail through the installation of 42 arched culverts throughout the 22-mile-long trail system, building a 35-foot-long bridge, rerouting approximately 5 miles of trail to avoid stream crossings and wetlands, and changing use of the trails from “open to vehicles 50 inches or less in width” to “open to motorcycle only.”



Intermountain Region: Categories of essential projects completed in watersheds moved to an improved condition.



### Recreation Improvements

- ◆ 60 miles of trail
- ◆ 100 acres of dispersed recreation sites



### Road Improvements

- ◆ 90 miles decommissioned
- ◆ 25 miles improved



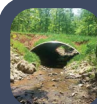
### Fuels Improvements

- ◆ 5,300 acres of prescribed fire



### Soil Improvements

- ◆ 5 acres of erosion control



### Aquatic Improvements

- ◆ 152 stream crossings
- ◆ 15 miles of stream restoration
- ◆ 16 acres of meadow or wetland restoration
- ◆ 5 acres of riparian habitat



### Range & Vegetation Improvements

- ◆ 265 acres improved through fencing and other rangeland improvements
- ◆ 140 acres of trees planted



### Other Improvements

- ◆ 100 acres of mineral withdrawal
- ◆ 100 acres of land acquisition for watershed protection



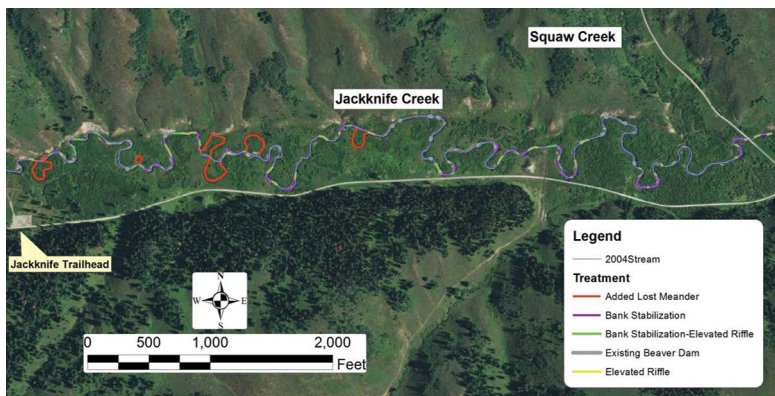
Floodplain reconstruction and recreation management before (left) and after (right), Left-Hand Fork of the Blacksmith Fork Watershed on the Uinta-Wasatch-Cache National Forest, Utah. USDA Forest Service photos.

## INTERMOUNTAIN REGION HIGHLIGHT WATERSHED

### *Jackknife Creek, Caribou-Targhee National Forest, Idaho*

The Jackknife Creek watershed contains less than 16 miles of roads, but they are mainly within the riparian corridors. These roads provide key access to trailheads in a heavily recreated nonmotorized area containing 43 miles of trail. It is a stronghold for Yellowstone cutthroat trout and northern leathersides, with 86 miles of perennial stream and 26 miles of fish-bearing stream providing important aquatic habitat. Road and trail sedimentation, poor drainage, undersized stream crossing, and road and trail failures on unstable hillslope contributed to reduced water quality and inadequate aquatic habitat and passage; affected channel stability; and caused excessive bank erosion. Historical grazing and beaver removal have added to the aquatic impacts. Agricultural practices on private lands were having similar negative impacts on watershed conditions. Because of a strong public-private partnership, the Jackknife watershed became a prime candidate to improve watershed condition.

In addition to efforts to improve watershed conditions on NFS lands, efforts on private lands and county roads were also completed to address water diversions, undersized stream crossing, and unstable stream conditions to achieve a holistic watershed improvement approach. Additional restoration efforts downstream and off NFS lands will continue to improve watershed condition within the Jackknife Creek watershed.



2014 Jackknife Creek restoration reach covering 2.5 miles of stream utilizing various treatments to achieve project objectives, Caribou-Targhee National Forest, Idaho. USDA Forest Service photo.

## PARTNERS

*Trout Unlimited, U.S. Fish and Wildlife Service, Bonneville County, USDA Natural Resources Conservation Service, Eastern Idaho Resource advisory council, Idaho Fish and Game, Idaho Parks and Recreation, Eagle Rock Backcountry Horseman, NW Youth Corporation, private landowners*



Prior to restoration at culvert looking downstream. USDA Forest Service photo.



Immediately after restoration completed. USDA Forest Service photo.



Four years after restoration. USDA Forest Service photo.

- 4 miles of stream restoration
- 7 stream crossings upgraded to bridges
- 9 stream crossings upgraded to open bottom structures for aquatic passage
- 6.6 miles of road improved
- 1.3 miles road decommissioning
- 2.5 miles road converted to trails
- 6 miles of trail relocated

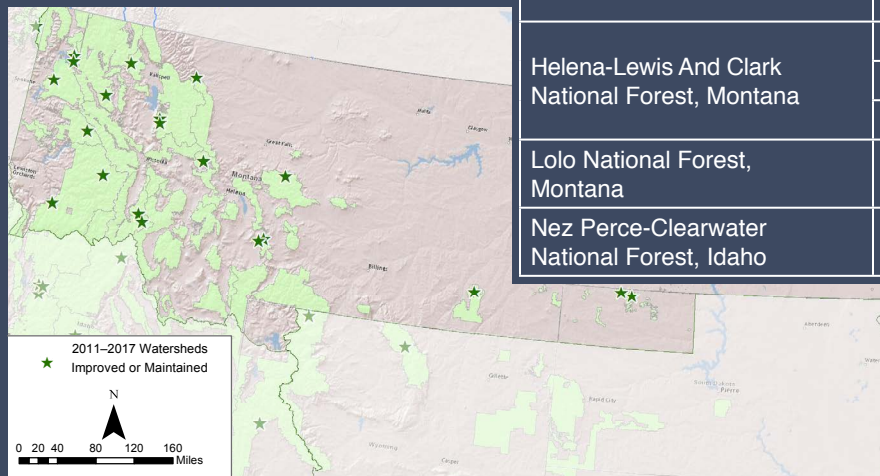
# NORTHERN REGION

Idaho Panhandle, Montana, North Dakota, South Dakota

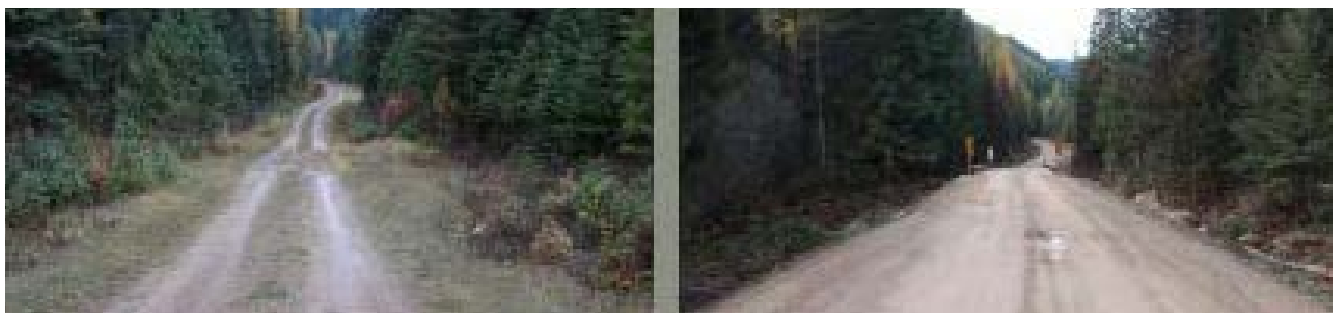
21 watersheds improved or maintained

\$4.2 million invested in watershed improvement by Forest Service

\$939,000 by 31 different State, local, and national partners



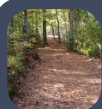
National Forest or Grassland	Watershed Improved or Maintained
Bitterroot National Forest, Montana and Idaho	East Fork Bitterroot River-Bartie Lord Creek
	Upper Sleeping Child
Clearwater National Forest, Idaho	Fishing Creek
Custer Gallatin National Forest, Montana	Upper Beaver Creek
	Upper South Fork Sixteenmile Creek
	Pass Creek
Dakota Prairie Grasslands, North Dakota and South Dakota	Deer Creek-North Fork Grand River
	Giles Creek-North Fork Grand River
	Pigeon Point-Sheyenne
Flathead National Forest, Idaho	Cold Creek
	Jim Creek
	Sheppard Creek
Idaho Panhandle National Forests, Idaho	Bruin Creek-St Joe River
	Iron Creek-Little North Fork Coeur d'Alene River
	Lower Lightning
	Middle Lightning
Helena-Lewis And Clark National Forest, Montana	Copper Creek
	Lower Dry Fork Belt Creek
	Lower South Fork Two Medicine River
Lolo National Forest, Montana	West Fork Fishtrap
Nez Perce-Clearwater National Forest, Idaho	Meadow Creek



Westfork Fishtrap Bridge Road before (left) and after (right) implementation of best management practices on the Lolo National Forest, Montana. USDA Forest Service photos.

## WATERSHED RESTORATION AND INFRASTRUCTURE

Lightning Creek in the Upper and Lower Lightning Creek watersheds on the Idaho Panhandle National Forests had a long history of destructive floods affecting bridges, roads, levees, and adjacent private property in the town of Clark Fork. By completing restoration work, flood impacts are reduced, and the lifespan of critical infrastructure in the town and on surrounding properties is increased.



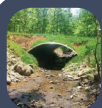
### Recreation Improvements

- ◆ 1 mile of trail
- ◆ 110 acres of dispersed recreation



### Road Improvements

- ◆ 430 miles decommissioned
- ◆ 80 miles improved



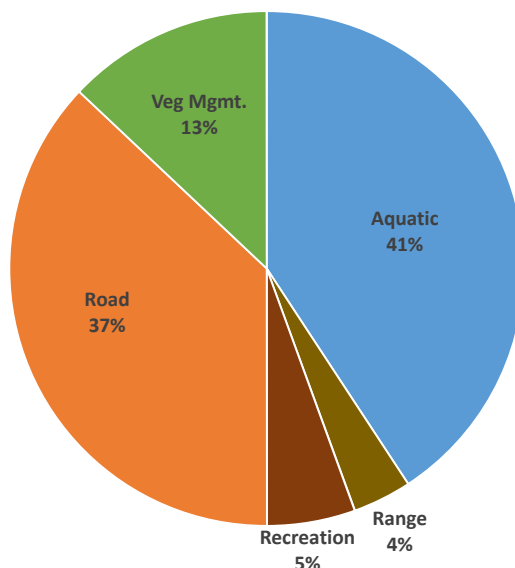
### Aquatic Improvements

- ◆ 390 stream crossings
- ◆ 130 acres impacted by gullies
- ◆ 50 miles of stream restoration



### Range & Vegetation Improvements

- ◆ 4,740 acres improved through fencing and other rangeland improvements
- ◆ 2,870 acres treated for non-native plants



Northern Region: Categories of essential projects completed in watersheds moved to an improved condition.

## NORTHERN REGION HIGHLIGHT WATERSHED

### *Upper Sleeping Child Creek, Bitterroot National Forest, Montana*

The Upper Sleeping Child Creek watershed was selected as a priority to restore watershed function, soil productivity, and fish habitat by significantly reducing erosion and sedimentation on adjacent NFS lands. The watershed contains several formerly private “checkerboard” sections that belonged to Darby Lumber Company, which liquidated the timber base and abandoned the road system prior to bankruptcy. Many existing roads were substandard, in poor condition, poorly located, and are no longer needed for timber management. Many of these roads are chronic sediment sources that were exacerbated by wildfires in 2000.

The forest reduced long-term road system maintenance costs and environmental effects by completing road decommissioning and road storage in partnership with the Bitter Root Water Forum (BRWF). The BRWF secured more than \$186,000 in grant funding, which covered 47 percent of the total project costs. The BRWF also directly implemented the highest priority road decommissioning in the headwaters of Upper Sleeping Child Creek. BRWF also completed monitoring on roads proposed for decommissioning before the project, during, and after the work was completed at established plots. Monitoring will be continued for the next 3 years to track revegetation success. BRWF will also use the monitoring sites as a future educational resource for volunteers and students.



Road decommissioning in process, Bitterroot National Forest, Montana.  
USDA Forest Service photo.

## PARTNERS

*Bitterroot Water Forum (obtained funds from State of Montana), Bitterroot Trout Unlimited, Montana Fish, Wildlife, and Parks, Montana Trout Unlimited*

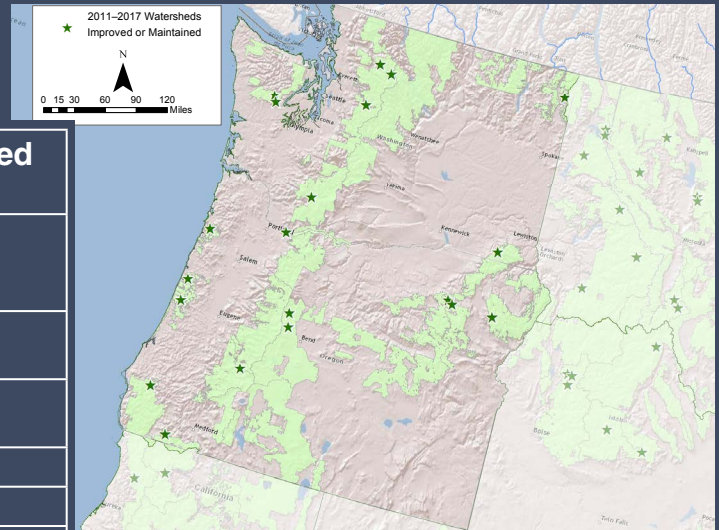


USDA Forest Service photos.

- 200 acres of soil and water resources improved
- 56 culverts removed
- 14 miles of road storage (hydrologically stabilized)
- 32 miles road decommissioned
- 30 miles of road and trail drainage improvements and maintenance

# PACIFIC NORTHWEST REGION

Oregon, Washington



National Forest	Watershed Improved or Maintained
Columbia River Gorge National Scenic Area, Oregon and Washington	Latourell Creek
Colville National Forest, Washington	East Branch LeClerc Creek
Gifford Pinchot National Forest, Oregon	Lower Clear Creek
Deschutes National Forest, Oregon	Lower Lake Creek
	Upper Whychus Creek
Mt Baker-Snoqualmie National Forest, Washington	Big Creek
	Upper South Fork Skykomish River
	Sulphur Creek
Olympic National Forest, Washington	Lower South Fork Skokomish River
	Upper South Fork Skokomish River2
Rogue River-Siskiyou National Forests, Oregon	Headwaters South Fork Coquille River
	Grayback Creek
Siuslaw National Forest, Oregon	Farmer Creek-Nestucca River
	Lower Drift Creek (Alsea River)
	Upper North Fork Siuslaw River
Umatilla National Forest, Oregon	Upper North Fork Touchet
Wallowa-Whitman National Forest, Oregon	Lower Meadow Creek
	Middle Meadow Creek
	North Fork Catherine Creek
Willamette National Forest, Oregon	Staley Creek

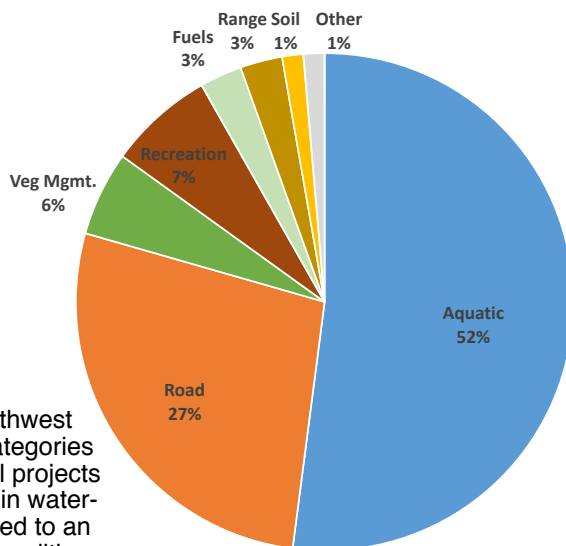
20 watersheds improved or maintained

\$13.4 million invested in watershed improvement by Forest Service

\$12.8 million by 65 different State, local, national, and Tribal partners

## IMPROVING WATERSHEDS THROUGH STREAM RESTORATION

Although almost all regions include essential projects in the aquatic category, the Pacific Northwest Region has the most significant number of total miles and acres improved. In the East Branch LeClerc Creek watershed on the Colville National Forest, restoration efforts were focused on improving spawning habitat for bull trout and protecting a population of west-slope cutthroat trout. In this watershed, portions of the riparian vegetation were eliminated through road building and harvest or degraded through livestock overgrazing and excessive dispersed recreational use. To improve habitat and connectivity, the forest and its partners from the State of Washington, Kalispell Tribe of Indians, Pend Oreille Public Utility Department, and Stimson Lumber Company replaced 26 culverts and placed large wood to create habitat on 14 miles of stream.



Pacific Northwest Region: Categories of essential projects completed in watersheds moved to an improved condition.



Unloading full-length trees for use in stream restoration on Lower Clear Creek, Gifford Pinchot National Forest, Washington. USDA Forest Service photo.



### Recreation Improvements

- ◆ 30 miles of trail
- ◆ 10 acres of dispersed recreation sites



### Road Improvements

- ◆ 170 miles decommissioned
- ◆ 110 miles improved



### Fuels Improvements

- ◆ 380 acres of prescribed fire or thinning



### Aquatic Improvements

- ◆ 51 stream crossings
- ◆ 70 miles of stream restoration
- ◆ 50 acres of meadow or wetland restoration
- ◆ 280 acres of riparian habitat



### Range & Vegetation Improvements

- ◆ 10 acres improved through fencing and other rangeland improvements
- ◆ 200 acres treated for non-native vegetation



### Other Improvements

- ◆ 1,760 acres acquired to protect sensitive lands

## PACIFIC NORTHWEST REGION HIGHLIGHT WATERSHED

### *Upper South Fork Skokomish River, Olympic National Forest, Washington*

The Upper South Fork Skokomish watershed is in the southeastern corner of the Olympic Peninsula in Washington State. It is a vital part of the Hood Canal marine ecosystem and the nationally significant Puget Sound and supports three federally listed fish species. The dominant land use within the South Fork Skokomish watershed was commercial timber harvest from the 1940s to 1992. By the mid-1990s, approximately 41 percent of the Upper South Fork Skokomish subwatershed had been clearcut, and the overall road density was 3.3 miles per square mile. Impacts on watershed resources, resulting from extensive timber harvest, road construction, and insufficient funds to maintain the road system, led to an increased frequency and magnitude of surface erosion and mass wasting. Delivery of sediment to aquatic ecosystems resulted in degradation of fish habitat and water quality, triggering the need to develop and implement a comprehensive watershed restoration action plan.

In 2015, the Olympic National Forest completed all essential aquatic restoration work outlined in the plan for this subwatershed, thereby improving watershed conditions and supporting fish recovery efforts. The success of this program of work was largely due to the strong support by the Skokomish Watershed Action Team collaborative and the Skokomish Tribe. Many hands contributed to the quality restoration work. As such, it provided social and economic benefits to local and rural communities through jobs and community engagement. Projects were supported with multiple sources of funding, including \$2.13 million in Forest Service Legacy Roads and Trails Program funds from 2012 to 2015, when work was finished, and several million dollars more prior to that.

#### **PARTNERS**

*Bitterroot Washington Trail Association, Washington Conservation Corps, Skokomish Tribe, The Wilderness Society, Skokomish Watershed Action Team, Olympic Forest Coalition, Great Old Broads for Wilderness, Washington State Department of Ecology*

- 345 acres commercial and precommercial thinning and elk forage enhancement
- 1 lake restoration—3 acres
- 10 miles stream nutrient enhancement (annual)
- 11.2 miles road decommission, closure, or trail conversion
- 7.1 miles road Storm Damage Risk Reduction upgrades
- 1 culvert fish passage barrier correction
- 4 trail bridges replaced



Road decommissioning work under way. (Inset: Removal of a culvert that created a barrier to fish passage.) USDA Forest Service photos.

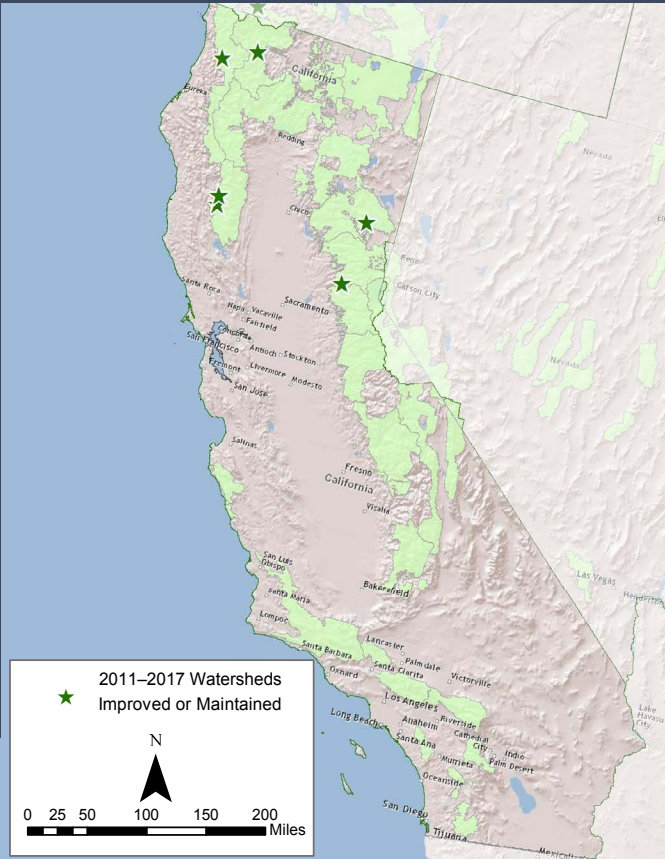
# PACIFIC SOUTHWEST REGION

California

6 watersheds improved or maintained

\$1.11 million invested in watershed improvement by Forest Service

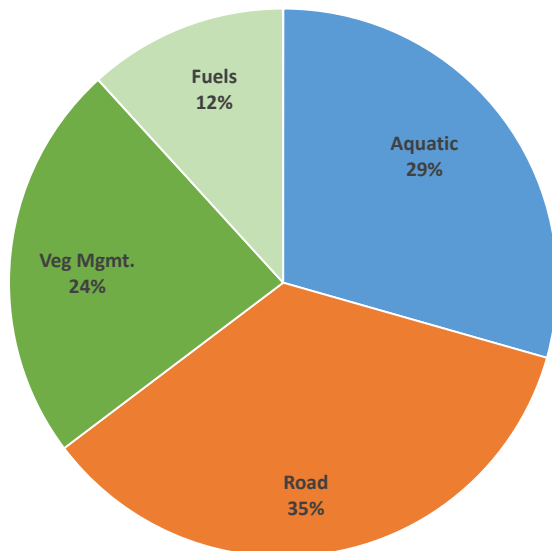
\$451,100 by 6 different State, local, and Tribal partners



National Forest	Watershed Improved or Maintained
Klamath National Forest, California	Canyon Creek
Mendocino National Forest, California	Bear Creek-Elk Creek Thatcher Creek
Plumas National Forest, California	Big Grizzly Creek
Six Rivers National Forest, California	Bluff Creek
Tahoe National Forest, California	Peavine-N. Fork/Mid. Fork American River

## IMPORTANCE OF MAINTAINING WATERSHEDS

Although many projects were implemented under the WCF to improve watershed conditions, watersheds that are important to maintain in a good condition can also be considered a priority. For example, the thinning that occurred in the Peavine Creek-North Fork Middle Fork American River watershed in California has maintained the watershed in functioning condition. In this watershed, 817 acres of the thinning occurred along ridges to protect the steeper parts of the watersheds and 60 acres of thinning occurred in areas to reduce risk of loss due to bark beetles.



Pacific Southwest Region: Categories of essential projects completed in watersheds moved to an improved condition.



Streambank stabilization 3 years after reshaping banks and revegetation in the Pacific Southwest region. USDA Forest Service photo.



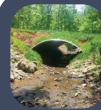
### Road Improvements

- ◆ 30 miles decommissioned
- ◆ 30 miles improved



### Fuels Improvements

- ◆ 1,280 acres of thinning



### Aquatic Improvements

- ◆ 1 stream crossing
- ◆ 20 acres of meadow restoration
- ◆ 3 acres of water quality improvement



### Range & Vegetation Improvements

- ◆ 40 acres of non-native plant treatment
- ◆ 3 acres of revegetation
- ◆ 260 acres of thinning

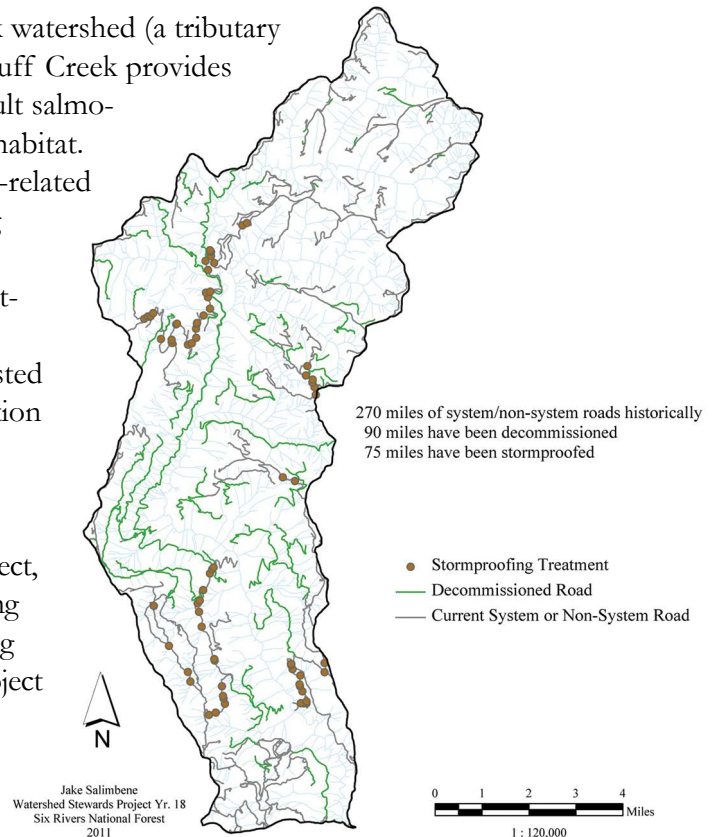
## PACIFIC SOUTHWEST REGION HIGHLIGHT WATERSHED

### *Bluff Creek, Six Rivers National Forest, California*

A culmination of 10 years of effort, in 2016, Six Rivers National Forest completed the major essential projects in the Bluff Creek watershed (a tributary to the Klamath River) in northwestern California. Bluff Creek provides critical thermal refugia for migrating juvenile and adult salmonids, as well as approximately 19 miles of spawning habitat. Because roads are the largest source of management-related sediment, the primary focus was road stormproofing and road decommissioning. Road decommissioning also helps stop the spread of Port-Orford Cedar root-rot disease (*Phytophthora lateralis*). Bluff Creek is a key watershed under the Northwest Forest Plan and is listed as impaired for sediment and temperature under section 303(d) of the Clean Water Act.

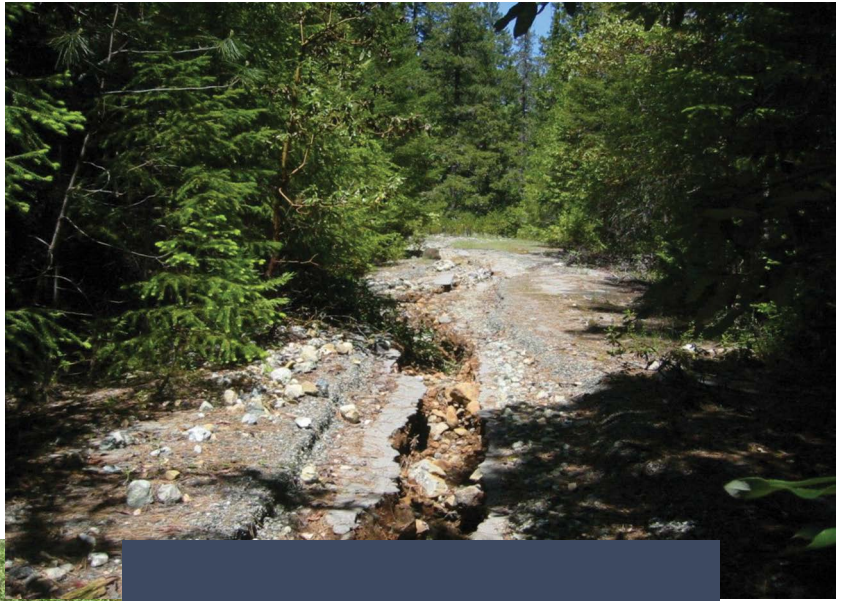
The forest was fortunate to have a capable and willing partner in the Karuk Tribe. Toward the end of the project, Tribal members were doing almost all the work including site surveys, development of project plans, earth moving with heavy equipment and tribal operators, and postproject monitoring. This effort was an excellent opportunity to employ local Tribal members to do watershed restoration on their ancestral lands.

The Tribe was also able to bring some money to the effort from the Bureau of Indian Affairs. Funding was also obtained from the California Department of Fish and Game (now the California Department of Fish and Wildlife), the California Off-Highway Vehicle Association (“green sticker” grants), Humboldt County, and the Mid Klamath Watershed Council.



## PARTNERS

*Karuk Tribe, Yurok Tribe, Humboldt County, Mid-Klamath Watershed Council*



- 15 acres invasive plant treatment
- 37 miles road decommissioned (90 total since 2009)
- 5 miles road stormproofed (75 miles since 2009)

Top: Evidence of stream crossing failure. Stream flow was diverted down road about 100 feet, then onto the hill slope, cutting a new channel. Bottom: Finished outsloped section of previously gullied road reach. USDA Forest Service photos.

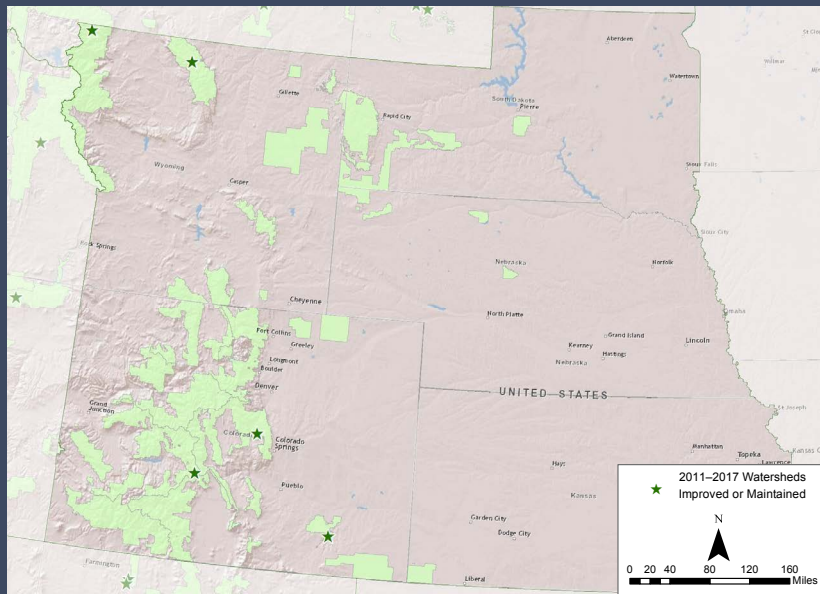
# ROCKY MOUNTAIN REGION

Colorado, Kansas, Nebraska, South Dakota, Wyoming

5 watersheds improved or maintained

\$2.88 million invested in watershed improvement by Forest Service

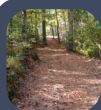
\$1.99 million by 19 different State, local, and national partners



National Forest or Grassland	Watershed Improved or Maintained
Big Horn National Forest, Wyoming	Upper Tongue River
Grand Mesa, Uncompagre, and Gunnison National Forests, Colorado	Marshall Creek
Pike and San Isabel National Forests Cimarron and Comanche National Grasslands, Colorado	Minnie Canyon-Purgatorie River West Creek
Shoshone National Forest, Wyoming	Squaw Creek-Clarks Fork Yellowstone River



Fence installation on Rourke Mesa, Minnie Canyon Watershed, on the Comanche National Grassland, Colorado. USDA Forest Service photo.



#### Recreation Improvements

- ◆ 22 miles of trail



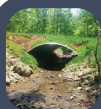
#### Road Improvements

- ◆ 27 miles decommissioned
- ◆ 51 miles improved



#### Fuels Improvements

- ◆ 190 acres of prescribed fire or thinning



#### Aquatic Improvements

- ◆ 4 stream crossings
- ◆ 1 acre of meadow restoration
- ◆ 4 miles of improved stream function and habitat
- ◆ 15 acres of riparian or spring habitat

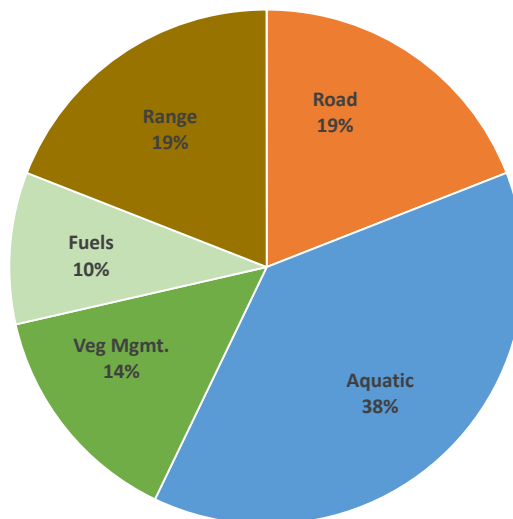


#### Range & Vegetation Improvements

- ◆ 1,050 acres improved through fencing and other rangeland improvements
- ◆ 200 acres treated for non-native plants
- ◆ 140 acres thinned to improve habitat
- ◆ 7 acres of trees planted

## WATERSHED RESTORATION THROUGH RESOURCE ADVISORY COMMITTEES

Projects recommended by Resource Advisory Committees (RAC), authorized and funded under the Secure Rural Schools and Community Self-Determination Act, play an important role in watershed restoration in all western regions. In the Rocky Mountain Region on the Marshall Creek watershed in south-western Colorado, the Saguache County RAC played an important role in restoration efforts. The Saguache County RAC helped determine projects and allocated funding for implementation of projects that reduced sediment delivery to stream habitats, increased channel and floodplain function, and improved aquatic organism passage.



Rocky Mountain Region: Categories of essential projects completed in watersheds moved to an improved condition.

## ROCKY MOUNTAIN REGION HIGHLIGHT WATERSHED

### *Clarks Fork Yellowstone River-Squaw Creek, Shoshone National Forest, Wyoming*

The Clarks Fork Yellowstone River-Squaw Creek watershed contains portions of the Absaroka-Beartooth Wilderness and the High Lakes Wilderness Study Area, numerous outstanding scenic and recreational opportunities, high-value fish and wildlife habitat, and unique wetland and fen ecosystems, and botanical resources. The Squaw Creek watershed was selected as a priority due to the identified resource concerns, the ability of the forest to effectively address those concerns, and prior National Environmental Policy Act analysis that provided momentum to move forward with project design and implementation. Projects to improve forest health included relocating or maintaining roads and trails to protect water quality, addressing habitat fragmentation concerns, and maintaining stream health were implemented.

Internal and external partnership opportunities with the Custer-Gallatin National Forest, the Montana Conservation Corps, and a local range permittee facilitated accomplishment of several projects, contributing to the overall success of improving the condition of the watershed.

Improved conditions in this watershed serve to—

- Restore and maintain healthy watersheds and diverse habitats.
- Improve the quality and availability of outdoor recreation experiences.
- Reduce the risk to communities and natural resources from wildfire.
- Build community capacity to suppress and reduce losses from wildfires.
- Provide a reliable supply of forest products over time that is consistent with achieving desired conditions on NFS lands and helps maintain or create processing capacity and infrastructure in local communities.

Additional long-term restoration opportunities in this watershed that will further stabilize and maintain this condition include rehabilitation of the Ghost Creek gravel pit after the anticipated end of its use in 2019 and floodplain restoration on Muddy Creek with potential beaver reintroduction.

#### **PARTNERS**

*Montana Conservation Corp and grazing permittee*



Prescribed burning unit. USDA Forest Service photo.



Ghost Creek offsite water development. USDA Forest Service photo.



Trail improvements to protect soil and water. USDA Forest Service photo.

- 497 acres of forest condition improvement
- 3 acres of reforestation
- 49 acres of beetle-killed tree removal
- 10 miles of trail maintenance and ½ mile of trail relocation and improvement
- Replacement of undersized crossing with a low water crossing
- 13 miles of road maintenance and additional drainage structures installed
- 1 livestock water development

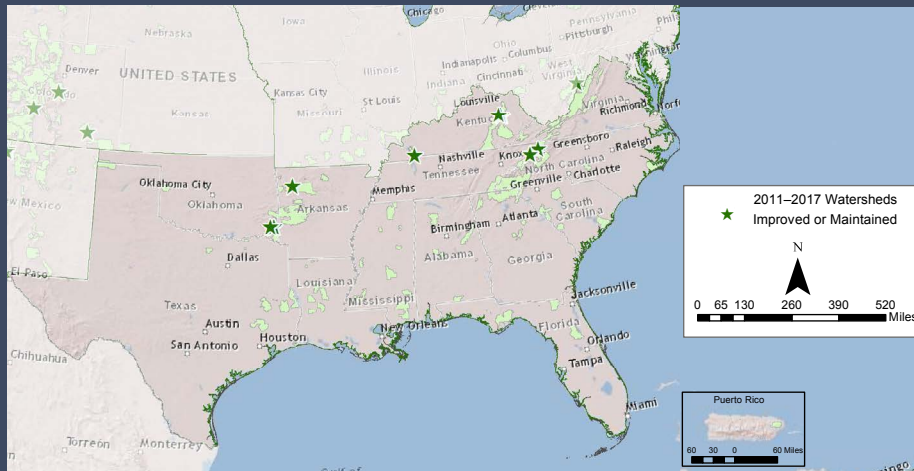
# SOUTHERN REGION

Arkansas, Alabama, Georgia, Florida, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, Tennessee, Texas, South Carolina, Virginia, Puerto Rico

9 watersheds maintained or improved

\$2.2 million invested in watershed improvement by Forest Service

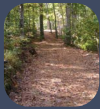
\$1.44 million by 20 different State, local, and national partners



National Forest	Watershed Improved or Maintained
Cherokee National Forest, Tennessee	Watauga Lake
	Nolichucky River-Clark Creek
Daniel Boone National Forest, Kentucky	Gladie Creek-Red River
	Clifty Creek-Red River
	Indian Creek-Red River
Land Between the Lakes National Forest, Kentucky	Dry Creek-Cumberland River
Ouachita National Forest, Arkansas and Oklahoma	Carter Creek
	Holly Creek Mountain Fork
Ozark-St Francis National Forest, Arkansas	Fleming Creek-White River

## IMPROVING WATERSHEDS THROUGH IMPROVING RECREATION

This region has the highest percentage of recreation-related essential projects, with 20 miles of trails and 114 acres of dispersed recreation sites improved. These improvements occurred on three watersheds on Kentucky's Daniel Boone National Forest in tributaries to the Red River. Improvements were designed to improve water quality in order to protect the Red River Gorge by reducing erosion and stream sedimentation from recreation. The efforts on the Daniel Boone National Forest also resulted in the formation of a new watershed group and a larger watershed plan to guide water pollution abatement efforts.



### Recreation Improvements

- ◆ 20 miles of trail
- ◆ 170 acres of dispersed recreation sites



### Road Improvements

- ◆ 2 miles decommissioned
- ◆ 55 miles improved



### Fuels Improvements

- ◆ 2,640 acres of prescribed fire



### Aquatic Improvements

- ◆ 13 stream crossings
- ◆ 100 miles of stream restoration and water quality improvement

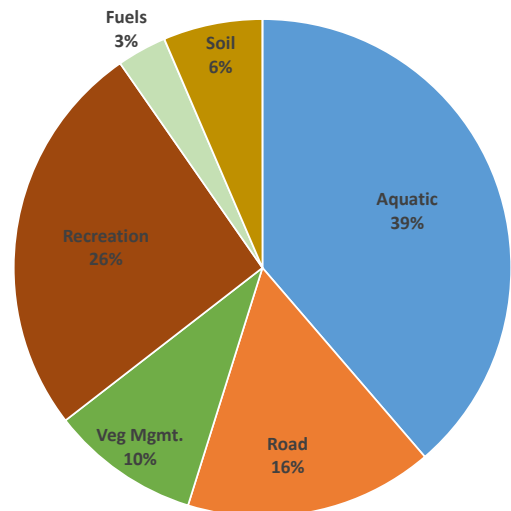


### Range & Vegetation Improvements

- ◆ 55 acres of erosion control
- ◆ 30 acres of revegetation
- ◆ 270 acres treated for non-native vegetation



Before (top) and after (bottom) culvert removal in the Fleming Creek-White River Watershed on the Ozark St. Francis National Forests, Arkansas. USDA Forest Service photo.



Southern Region: Categories of essential projects completed in watersheds moved to an improved condition.

## SOUTHERN REGION HIGHLIGHT WATERSHED

### *Dry Creek-Cumberland River, Land Between the Lakes National Recreation Area, Kentucky*

The Dry Creek-Cumberland River watershed is primarily a day-use recreational area. Opportunities such as backcountry camping, hunting, fishing, berry picking, wildlife viewing, and cemetery visits occur within the boundary. The watershed has legacy issues inherited from Tennessee Valley Authority (TVA), as well as past farming and land management issues prior to TVA acquisition. Stream channels were modified due to sediment (gravel) transport, lack of large wood, and failed culverts. Small areas of sheet and rill erosion are associated with hillside and trail erosion, as well as cropping on highly erodible land.

The restoration objective for this watershed was to provide resilient and stable conditions to ensure the quality and quantity of water to protect ecological functions and support intended beneficial uses. Another objective was to provide economic benefits to local communities. All construction work associated with this project went to local contractors.



Regrowth after prescribed burn. USDA Forest Service photo.

## **PARTNERS**

*Trigg County Conservation District, USDA Natural Resources Conservation Service, Murray State University, permit farmers*



Dry Creek-Cumberland River Trail  
before treatment. USDA Forest  
Service photo.



Dry Creek-Cumberland River Trail  
after treatment. USDA Forest  
Service photo.

- 46 acres of hillside/trail erosion restoration
- 7 hardened stream crossings
- 5 miles of stream restoration (large wood)
- 32 acres of permanent vegetation established (field borders)
- 1.7 acres of streambank armoring
- 170 acres noxious or invasive weed control
- 2,636 acres of prescribed fire
- 38 miles of road maintained to standard

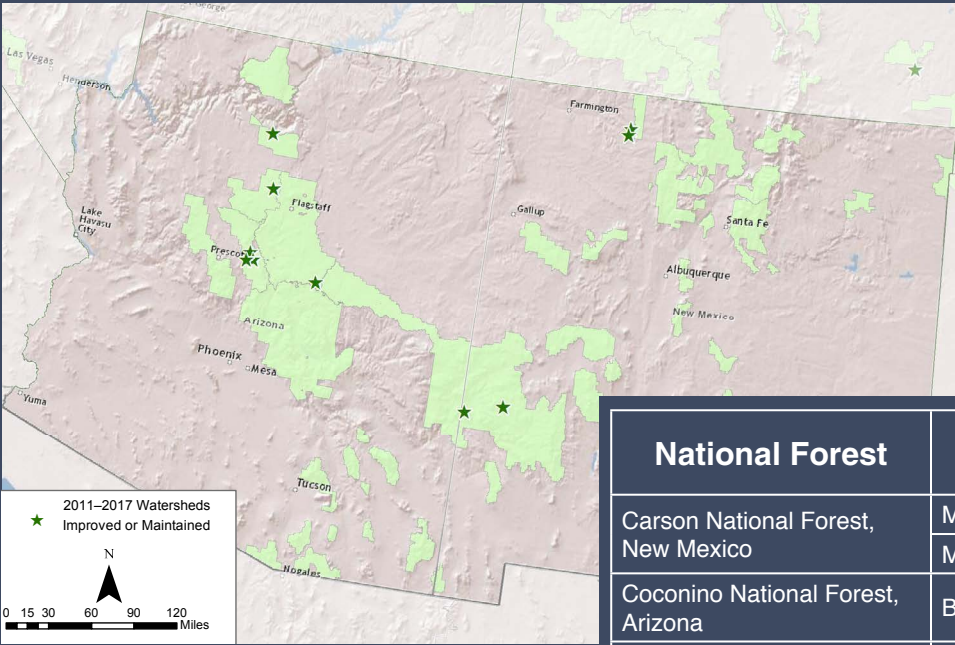
# SOUTHWESTERN REGION

Arizona, New Mexico

10 watersheds improved or maintained

\$5.3 million invested in watershed improvement by Forest Service

\$310,900 by 20 different State, local, and national partners



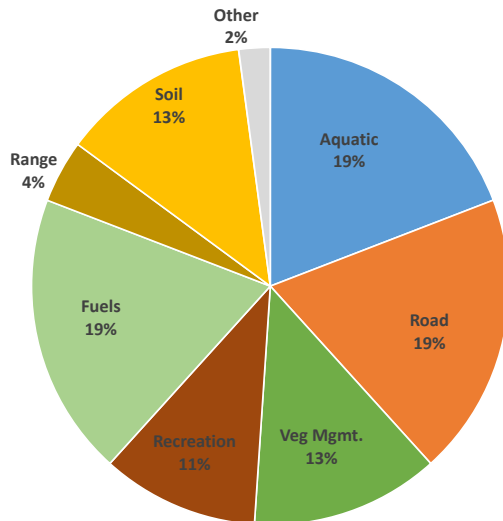
National Forest	Watershed Improved or Maintained
Carson National Forest, New Mexico	Munoz Canyon
	Martinez Canyon-Carrizo Canyon
Coconino National Forest, Arizona	Barbershop Canyon
Gila National Forest, Arizona	Snow Canyon
	Vigil Canyon
Kaibab National Forest, Arizona	Coconino Wash Headwaters
	Upper Spring Valley Wash
Prescott National Forest, Arizona	Cherry Creek
	Black Canyon
	Upper Ash Creek

## WATERSHED RESTORATION TO REDUCE FIRE RISK

Since 2011, the Southwest Region has completed 50,800 acres of hazardous fuels reduction in more than half of the improved priority watersheds through thinning, prescribed burning, and management of wildfire. Much of the total acreage was treated in the Coconino Wash Headwaters watershed on the Kaibab National Forest through wildfires managed for resource benefit. Through the use of managed wildfire, the forest was able to treat 72 percent of NFS watershed acres. Managing wildfire for natural resource benefit can be a cost-effective way to improve watershed condition. The Kaibab National Forest estimates that cost per acre for the 27,055 acres treated using wildfire was \$67 per acre.



Pipe and cable fence built to protect Vigil Spring in the Vigil Canyon Watershed on the Gila National Forest, Arizona. USDA Forest Service photo.



Southwestern Region: Categories of essential projects completed in watersheds moved to an improved condition.



### Recreation Improvements

- ◆ 3 miles of trail
- ◆ 230 acres of dispersed recreation sites



### Road Improvements

- ◆ 55 miles decommissioned
- ◆ 50 miles improved



### Fuels Improvements

- ◆ 24,460 acres of prescribed fire or thinning
- ◆ 27,060 acres of management of wildfire



### Soil Improvements

- ◆ 4,000 acres of erosion control and soil improvement



### Aquatic Improvements

- ◆ 1 stream crossing
- ◆ 45 acres of meadow restoration
- ◆ 30 acres of gully restoration
- ◆ 740 acres of riparian habitat



### Range & Vegetation Improvements

- ◆ 1,460 acres improved through fencing and other rangeland improvements
- ◆ 6,830 acres treated for non-native plants
- ◆ 2,530 acres thinned to improve habitat

## SOUTHWESTERN REGION HIGHLIGHT WATERSHED

### *Black Canyon, Prescott National Forest, Arizona*

The Black Canyon watershed is tributary to the Verde River, which is the only free-flowing perennial drainage in central Arizona that supports diverse flora and fauna with federally listed and Forest Service sensitive species designation. The Verde River is federally designated as critical habitat for razorback sucker and proposed critical habitat for spikedace and loach minnow. A 40-mile designated Wild and Scenic River segment of the Verde is below the confluence of Black Canyon. The Verde River is also one of two major surface water sources for the Phoenix metropolitan area.

This watershed is a popular recreation destination that attracts hunters, hikers, off-road vehicle use, and dispersed camping. The watershed supports a diverse composition of ecosystems ranging from desert shrub, semi-desert grasslands, Pinyon-Juniper woodlands, interior chaparral, and Ponderosa pine. Pine dominates less than 5 percent of the vegetation within the watershed. These pine stands are socially important to local residents and ecologically important for wildlife habitat.

The overall restoration goal was to improve water quality issues caused by erosion and sedimentation from active gullying, roads and trails, historical grazing, and unmanaged recreation. Another concern was the potential loss of forest cover due to risk of bark beetle outbreak in the upper watershed.



Armored trail head to reduce soil damage and stabilize soil loss. USDA Forest Service photo.

## PARTNERS

*Youth Conservation Corps and Arizona State Parks*



Large photo: Gaddes Timber Sale to improve fire regime condition class and maintain coarse woody debris necessary for soil productivity. USDA Forest Service photo.

Small photo: Reconstruction/maintenance of erosion control enclosure fence near Burnt Tank. Implementation of erosion control was a common theme for many of the identified essential projects. USDA Forest Service photo.

- 1,058 acres of forest health treatments (thinning)
- 25 acres of gully stabilization and erosion control
- 1 mile of trail relocation
- 4 trail heads armored
- 170 acres of armored dispersed recreation sites
- 5 miles of road improvement
- 5 miles of road decommissioning
- 1 mile of road closure
- 10 acres of riparian area protection

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at [http://www.ascr.usda.gov/complaint\\_filing\\_cust.html](http://www.ascr.usda.gov/complaint_filing_cust.html) and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: [program.intake@usda.gov](mailto:program.intake@usda.gov).

USDA is an equal opportunity provider, employer, and lender.

